

# Radio Control CAR ACTION

THE WORLD'S LEADING RC CAR MAGAZINE

47380  
ASSOCIATED B2  
TUNING SECRETS

December 1996

15  
TOURING-  
CAR TIPS!

TEAM LOSI'S

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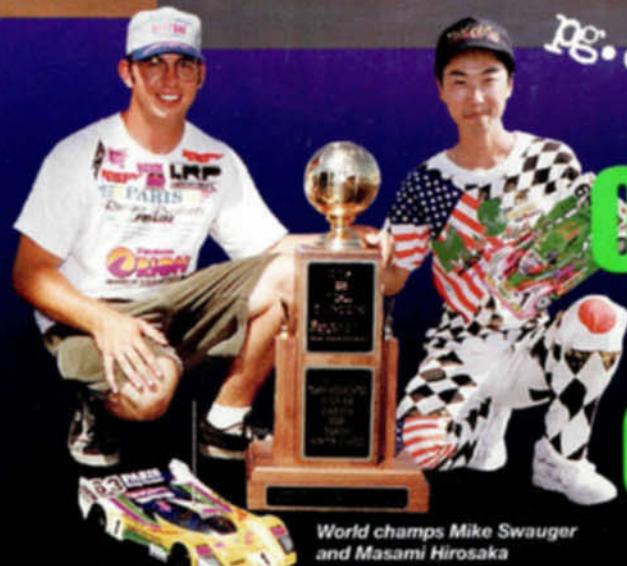
USA \$4.95  
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Tested:  
SCHUMACHER S.S.T.  
SERPENT Impact 2  
KYOSHO '67 'Vette



pg. 88



World champs Mike Swauger  
and Masami Hirosaka

ACTION FROM THE  
**ON-ROAD  
WORLD  
CHAMPS**

# Radio Control **CAR ACTION**

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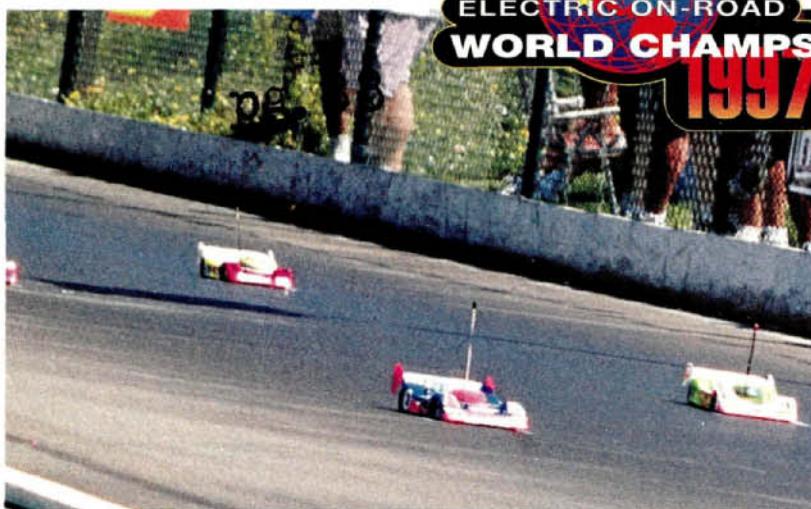
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**ON THE COVER:** Team Associated's RC10B2 (photo by Walter Sidas); Team Losi's new XX-T 'CR' (photo by John Howell); hot action and the new IFMAR World Champs, Mike Swauger and Masami Hirosaka (photos by George Gonzalez).

**THIS PAGE:** Kyosho Corvette Stingray (photo by Ken Marcum); Little Red Wagon (photo by Dave Sproul); IFMAR On-Road Worlds (photo by Gerge Gonzalez).

## Racers Wanted

**W**hat worry keeps every prominent figure in the R/C industry awake at night? The same concern that haunts the leader of any consumer-driven business—how to bring in new customers. The answer is exposure, and although this might seem to be a no-brainer, you'd be surprised at the variety of methods employed by promotion-minded manufacturers and race organizers. Needless to say, some ideas have borne more fruit than others.

The most successful events have been those that bring the racing action to the public. Duh! But I know of more indoor tracks

(the existence of which is known to few, but knowledgeable racers) than outdoor tracks. An indoor track can draw crowds if it's in a good location, such as in a heavily trafficked shopping center, but high rent often forces such tracks to more remote locations where few potential new customers are likely to venture.

Direct access to large numbers of consumers is why many have embraced parking-lot racing. The events are held outdoors—usually in the parking lot of a busy shopping center—and the classes are aimed at novices and those who race strictly for fun. When a hobby shop puts on a successful race in its parking lot, you can bet that quite a few curious spectators find their way into the store.

Yet indoor tracks or tracks that cater to the serious racer are also critically important. These businesses provide experienced racers with a place to compete against other skilled drivers. And high-level competition, such as the ROAR Nationals and World Championship, is as much a part of R/C racing as any grassroots program. After all, if you had nowhere to go once your racing skills have improved, you'd probably get bored quickly.

The moral of this story is this: all forms of racing are important to the well-being of the hobby. Parking-lot racing is essential because it attracts newcomers, and serious competition is important because it provides enjoyment for accomplished drivers.

### THIS MONTH'S HIGHLIGHTS

This issue contains coverage of events that fit into both racing categories. The ROAR Off-Road Stock Nationals gives unsponsored racers a shot at a prestigious national title without having to compete against the factory drivers. ROAR's decision to split the Nationals into two events has proven to be a good one. Factory and sponsored drivers are kept out of the Stock classes because of ROAR's ruling that those who race at the Stock Nats aren't eligible to race at the Modified Nats.

Associate editor George Gonzalez is at last back from his two-week sojourn in sunny California and the IFMAR On-Road World Championships. One-twelfth and  $\frac{1}{10}$  scales were combined this time around, so two new champions were crowned. You may remember George's awesome coverage of last year's Off-Road Worlds in Japan; well, he has once again "brought home the bacon."

We also feature tests of some of the very best new kits. Team Losi's new Double-XT 'CR' racing truck looks like the one to beat in '97, as does Schumacher's new S.S.T. touring car. We've also tested the incredibly fast Impact 2 nitro racer from Serpent. This  $\frac{1}{10}$ -scale, 2-speed terror is state-of-the-art, so if you're into gas, check it out.

  
Frank Masi, Executive Editor

# Radio Control CAR ACTION

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**Hot action at this year's IFMAR On-Road World Championship.**



### And the Winner is ...

Mr. Jeffrey Wineholt of Elton, MD, hit it right on in our "Project F1" give-away contest. He received at his home the incredible, customized HPI F1, complete with radio gear, battery pack and motor. We hope he's been busy at the local parking lots running his new ride since!



Here are his correct responses to the questions:

1. Which driver has won the most F1 world championships?  
*Juan Manuel Fangio*
2. Who was the first F1 world champion?  
*Dr. Giuseppe Farina*
3. In which year were turbos banned from F1?  
*1989*
4. When and where was the last U.S. Grand Prix held?  
*1989, Phoenix*
5. Who is the current F1 world champion, and what is his nationality?  
*Michael Schumacher, German*

Thanks to all our readers who took the time to send in their responses. As always, it's great to hear from so many of you!

### Can't We All Just Get Along?

I am an R/C fanatic from Australia. We have team drivers here, but they are not directly factory-supported as are some drivers in the USA. I am curious to know whether the factory drivers from opposing teams get along with

each other. I read *R/C Car Action*, so I know that you cover major events and are close to the factory teams. Is there any tension between drivers who have changed teams and their former teammates? I don't want to stir up anything; I'm just curious. I don't think there should be any great rivalry (if there is), because this is supposed to be an enjoyable hobby.

**CHRIS GORGOSKI**  
*cgor2@student.monash.edu.au*

**Hey Chris, most of the factory drivers from different teams get along just fine. At major racing events, it's not uncommon to find opposing drivers laughing and joking with each other between heats. Some drivers who switched teams continue to enjoy the friendship of ex-teammates. Of course there are exceptions, but these are few and far between. I've attended a couple of IFMAR World Championships and noticed that there is a great deal of tension in the air, but this is only because very important titles are at stake—titles that can have major repercussions for not only the drivers, but also the sponsors as well. There you have it.**

**George**

### How Does He Do That?

I have a couple of questions for ya. I race F1 here in Japan (I'm in the Air Force and stationed in Okinawa), and since I began racing at our local club, the average has been 14 to 15 laps in a 5-

minute qualifier. I race the HPI F1, and I've found its setup to be just as fast, if not a little faster, than all the other local speedsters. Then, last weekend, it happened: a guy who had never raced at our track before (at least I haven't seen him around) showed up and totally blew the doors off everyone in the qualifying heats and turned a solid 16 laps. He was visibly faster than the rest of us, and we thought for sure that his batteries would never make it all the way through the 8-minute A-Main running at that speed. Needless to say, he did it, or I wouldn't be writing this letter.

The only restriction in the F1 class here is that you have to run a stock Mabuchi 540 RS motor, and this keeps things fair and takes the mystery out of the old "What gear ratio should I run?" dilemma. My car's setup is a Tekin 411G, and I use a Motor Man SCRC 1700mAh battery pack. I run a 60.0 rollout in the qualifying heats and bump down a tooth to 58.0 for the Mains. With this ratio, my car starts to dump just as I cross the line. I think I'm pretty much at the high end of my setup, and I believe that I can't go any faster.

So here's my question: what could this guy be doing short of running an illegal motor? (No one bothered to check his motor.) Could it be his batteries? If so, what kind of battery could give you that kind of performance over the 1700mAh SCRC with a stock motor? Or could it be his speed control? Is there really that

much difference between the high-end speed controls and what I'm running? Any other speed or setup hints would be a great help. Thanks.

**CLINT STONEHAM**  
*stony@ns.oon.or.jp*

**Clint, are you running matched battery packs? What kind of ESC are you using? If you're running a budget speed control and sport packs, that could be the problem. If this fast guy uses a top-of-the-line ESC and some 30A matched 1700s, you won't stand a chance. He might also be using comm drops and high-quality bearing oil on his stock 540 motor; these things do increase performance. He might use smaller diameter tires and have his rollout gearing down to a science. He might also just be an awesome racer, and maybe he knows the fastest way around the track.**

**Next time you see him (that is, if you ever see him again, because I honestly believe that you might have been racing some sort of R/C ghost), check out his car and see what he's got. Ask him how he goes so fast (in a non-threatening manner, of course). When I race and I notice someone noticeably faster, I just have to know how he does it. I usually compliment him on his performance and ask whether he has any tips that will make me faster. There's nothing like a compliment to help break the ice. Good luck, and let me know what you find out.**

**George**

**WRITE TO US!** We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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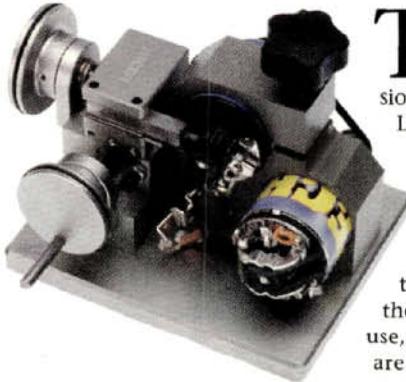
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George Gonzalez: [georgeg@airage.com](mailto:georgeg@airage.com)

In search of fun  
and glory, 'cause  
life's too short  
to be a sheep • by Chris Chianelli

INSIDE

# SCOOP



## In the Can!

The folks at Trinity Products now offer a stock-motor version of their popular Tru-Lathe. It allows you to cut the commutator without having to remove the armature—a big no-no in stock racing. Among the features that make the Tru-Lathe an easy-to-use, precision instrument are ultra-fine-pitch lead screws, machined pins (ensure exact motor/lathe alignment), quick-release

motor-clamping system and a carbide tool bit. For more information, contact Trinity Products Inc., 1901 E. Linden Ave., #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

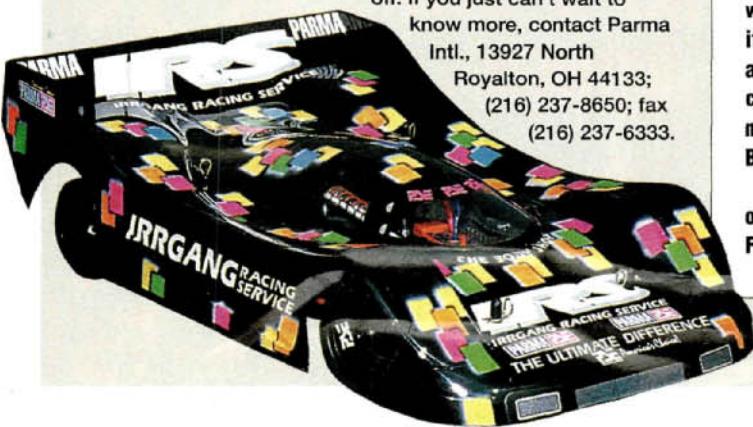
## Lean, MEAN GTP Machine



Parma/PSE's 1/10-scale Mazda body has national titles and countless regional wins to its credit, but the PSE R&D team still thought there was room for improvement. Now, with its longer tail section and tall rear spoiler, the Mazda no longer needs a separate wing to ensure it stays planted. The longer, lower front end provides all the downforce you need to maintain positive steering at high speeds. Add to that the much lower, narrower cockpit, and you have one lean, mean GTP machine.

Oh, yeah; while I'm on the subject of Parma/PSE, they're scheduled to release a new 1/10-scale Viper kit (not just the body) at the Chicago Model and Hobby Show. Of course, I've heard rumors: the word out there is that the attention to detail—right down to the scale engine—will knock your socks off. If you just can't wait to

know more, contact Parma Int'l., 13927 North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



## If you run it ...

... they will come. Once again, Paul Bender and his élite force of fun-race organizers put on an incredible event. How?—by combining the Second Annual Hobby Shack Expo and a "grand opening" parking-lot race at Hobby Shack's beautifully laid out new store in Mission Viejo, CA.



And come they did!—180 racers of all ages and types; entire family race teams! Hobby Shack parking-lot extravaganzas even attract world-champion types such as the venerable Joel "Magic" Johnson (top right). We all know that the Magic Man can be very serious about his racing, but he also knows how to have fun, and he understands the importance of staying lighthearted during the heat of competition.

And who's the other dedicated racer shown here (bottom right)? ... well, all I can say is if you crash and burn and don't win, you can always fall in love! That's the magic of a race run right; and, General Bender-san, you run them right!

Frank Masi will have the full report on this event/happening in the February issue.



SPY SHOTS BY GEORGE GONZALEZ

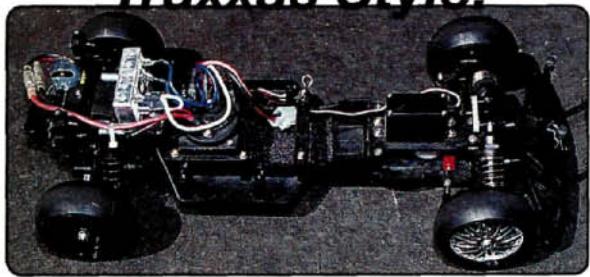
PHOTOS BY FRANK MASI AND GARY BENDER



## Always on the Edge ...

For years and years, I've watched the Traxxas strategy. They observe a trend and look for a need—a void to be filled. Then they fill it—usually with a well-thought-out product designed just to fit the void in question. Here is a shot of their new 2WD direct-drive parking-lot machine, whose mission will no doubt be cost-effective performance. Check out the tapered-crown pavement rubber. Traxxas tells me, "They really work." Don't worry; I'll have more on this stuff. Have I ever let you down?

### Parking Lot Traxxas Style!



... Which edge is that? you might ask. Cutting? Leading? Whatever; doesn't matter. If you've been in the hobby for more than 10 minutes, you're already well aware of Novak's reputation for leadership in technology. They recently unveiled two products that display their electronics talent. First, the Cyclone Programmable electronic speed control.

Trinity/Losi team drivers Brian Kinwald and Greg Hodapp gave spectators a look into the future when they used it to blow away the competition at the ROAR Modified Off-Road Nats in 4WD and Truck (respectively). Smaller than any other controller in the industry, the Cyclone boasts the lowest resistance (0.00167 ohm) and super-high frequency (24000Hz). The minimum brakes, dead-band, minimum drive and operating frequency can all be adjusted. Novak's other notables include Polar Drive Technology™, Hyperfet II™ transistors, One-Touch Set-Up™ and a brake-light kit with super-bright LED. Novak promises, "... Other revolutionary features will be revealed in the future, but must remain secret at this time."

Greg Hodapp's Cyclone was coupled to Novak's new Mercury Shielded FM receiver. Over two years in the making, this narrow-band micro receiver—one of the smallest available (1.10x1.54x0.47 inches)—features Novak's Chrome-Shielded Protection™. A vacuum plating process deposits a layer of chrome on the inside and outside of the case; according to Novak, it provides superior protection against motor, battery, speed-control and servo noise. Contact Novak Electronics Inc., 18910 Teller Ave., Irvine, CA 92612; (714) 833-8873; fax (714) 833-1631.



## Trinity Presents The SPEED GEMS Collection.

**-TOPAZ-**

4WD Buggy/1:10 Oval  
11 Turns, 3 Winds  
36,750 RPM, No. 9200

**-RUBY-**

2WD Trucks/Buggies  
16 Turns, 3 Winds  
25,600 RPM, No. 9201

**-SAPPHIRE-**

Monster Trucks, Planes, Boats  
17 Turns, 1 Wind  
24,150 RPM, No. 9202

**-DIAMOND-**

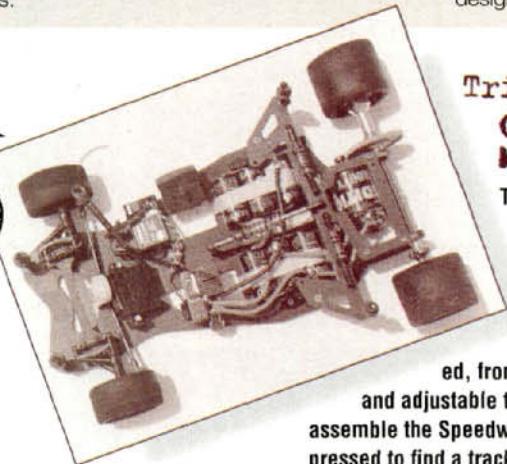
1:10 On-Road/Oval  
12 Turns, 2 Winds  
33,750 RPM, No. 9203

Bolink has always promoted R/C car racing to a broad audience by being involved with various forms of full-scale racing. In the past, Bolink has had a great response to its involvement with full-scale stock-car racing. More recently, the company has been associated with 600 Racing Inc., makers of the full-scale Legend Car. This time around, Bolink is sponsoring the 1996 sprint-car "Rookie of the Year" in the All Star Circuit of Champions series—about 80 races run across the eastern half of the United States. Some of the series' races are run in Florida during the February Speedweeks. All Sprinters involved in the program will carry Bolink's logo on the wing panels, and information on Bolink and R/C cars will be available at the tracks and in the race program brochures.



## On Wings of a Star

This recent venture will be used to promote Bolink's All Star Sprint car, which is the latest in a series of sturdy, economically priced kits designed for fun racing.



Trinity's New

## Street Fighter

The Switchblade 10 is Trinity's latest "concrete-contender," and it will also be available in a Speedway version—the 10-SS. The prototype debuted at the IFMAR World Championships and, in the capable hands of drivers

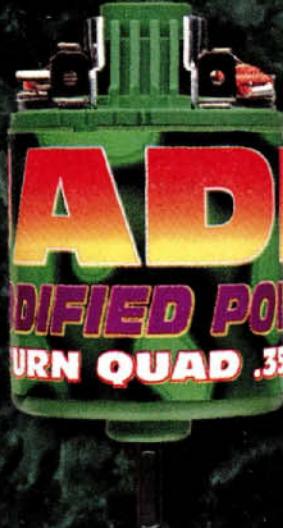
Joel Johnson and Brian Kinwald, it made a strong showing in the A-

Main. This car is so new that I haven't yet been able to ferret out all

the details. This much I do know: it will feature an easy-to-adjust, mold-

ed, front-suspension system; trailing-link rear suspension; Reactive Caster™; and adjustable toe-in, camber, wheelbase, roll center and ride height. You'll be able to assemble the Speedway version with a T-bar or trailing-link rear suspension, so you'll be hard-pressed to find a track you can't adjust it to. We'll have more later ... of course!

## Rare Examples Of Performance And Economy.



Speed Gems machine wound modified motors are an excellent alternative for a racer on a budget. Constructed with the same superior quality components as our expensive modified motors, they have a machine wound armature. This combination produces an extremely fast motor at about half the cost of a hand wound. Only \$49.99 list. For a rare combination of performance and economy, acquire a Speed Gem today.

### -ONYX-

2WD Trucks/Buggies  
14 Turns, 2 Winds  
29,100 RPM, No. 9204

### -JADE-

2WD Trucks  
15 Turns, 4 Winds  
27,060 RPM, No. 9206

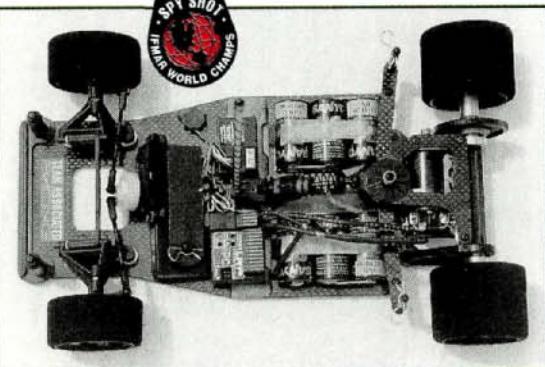
### -QUARTZ-

Touring/F-1, Planes, Boats  
19 Turns, 2 Winds  
21,540 RPM, No. 9207

## TRINITY.

1901 East Linden Avenue, Suite 8  
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## ASSOCIATED'S New On-Road Racers

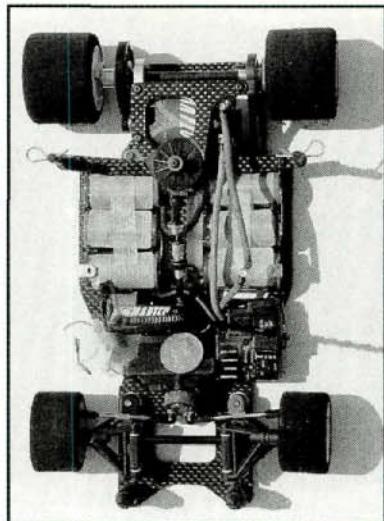


The IFMAR Worlds gave Team Associated a chance to parade—and prove!—two new cars. The RC12LC 1/12-scale on-road racer (right) features a new rear motor pod and T-bar design (improves suspension geometry), a new motor pod upper plate (makes soldering motor wires much easier), a new chassis (the cells are closer to its centerline), and a new Delta shock-damping system.

The RC10LC (below) has been dubbed the "real scale" car. It has the shortest possible legal wheelbase, and it's almost as narrow as Associated's superspeedway car, so it's much lighter and more aerodynamic; that means longer run times and higher top speeds. It has the same new motor pod as the RC12LC, and its newly designed chassis brings the cells as close to the centerline as they can be.

At the Worlds, Masami Hirosaka drove the RC12LC to victory by taking the TQ honors and winning the World Championship. Josh Cyril finished second overall with his brand-new RC10LC.

For more information, call Associated Electrics (714) 850-9337.



## Nasty Nissan

HPI gave us a glimpse of a new Nissan NPT92 body they designed to fit their new, narrower Road Star 10GW and Team Associated's new RC10LC on-road racer. Molded of 0.0030-inch thick Lexan, the body was designed to produce maximum downforce, and the tail has an extra 1/4 inch of lift that could be trimmed down to suit track conditions. A complete set of decals—window moldings, lights, front grill, stripes and, of course, HPI sponsor decals—is included. And that's all yours for just \$22! An extra-light version will be available soon. Call HPI at (714) 837-3250 and ask for product no. 7002.



## Fireblade 2000



**S**chumacher's world championship-winning design team has used its extensive race experience and stunning ingenuity to create the Fireblade 2000—this new, all-out, 2WD competition buggy. According to a factory representative, "Every single component was designed with winning in mind; careful suspension and transmission design optimizes the center of gravity and produces a sleek car with a profile so low that other cars look prehistoric alongside it." Here's a sample of its innovative features: low 2:1 transmission ratio for excellent punch out of the corners; super-low friction Blade steel drive shafts (patent applied for); laydown suspension system; 15-degree Schumacher Active Caster System™ (automatically increases caster as the suspension rises); and damping that can be adjusted without having to change the oil. Along with all the other adjustable features we usually see on competitive buggies, this machine should be tunable to almost any track conditions. Keep watching for a full "Thrash Test."



**READERS'**

# rides

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ELECTRONICS, INC. RACING TEAM

## MANY MODS

If there were a monthly award for the R/C enthusiast who used the most colored aluminum and titanium hop-up parts, Steve Dworzecki of St. Clair Shores, MI, would win this month hands down. His RC10B2 is loaded with Lunsford Punisher titanium turnbuckles and hinge pins, blue aluminum screws and nuts, aluminum wing mounts, MIP Golden shock shafts, blue seals and a Hammad Ghuman top shaft. An Airtronics Caliber 3Ps with a 94155 servo and an LRP ICS Digital ESC control this modified monster. Power is provided by various Orion cells and a set of Perfect Match batteries.



## EIGHT IS GREAT

The fine paint job on the Dahm's M-3 Extreme body sure makes a statement, but what's under the hood? Jerry Fisher of Highland Park, IL, tricked out his OFNA Pirat 10SR with an HPI Nitro Star 15SS engine that produces so much extra speed that he felt the need to install custom-machined, front and rear gearbox bearing carriers. The car rides on 2-inch off-road wheels and Pro-Line tires. Jerry controls the car with an Airtronics CS2P equipped with a Futaba FS-1 fail-safe unit. He hopes to add a 2-speed tranny and a side exhaust as soon as possible.

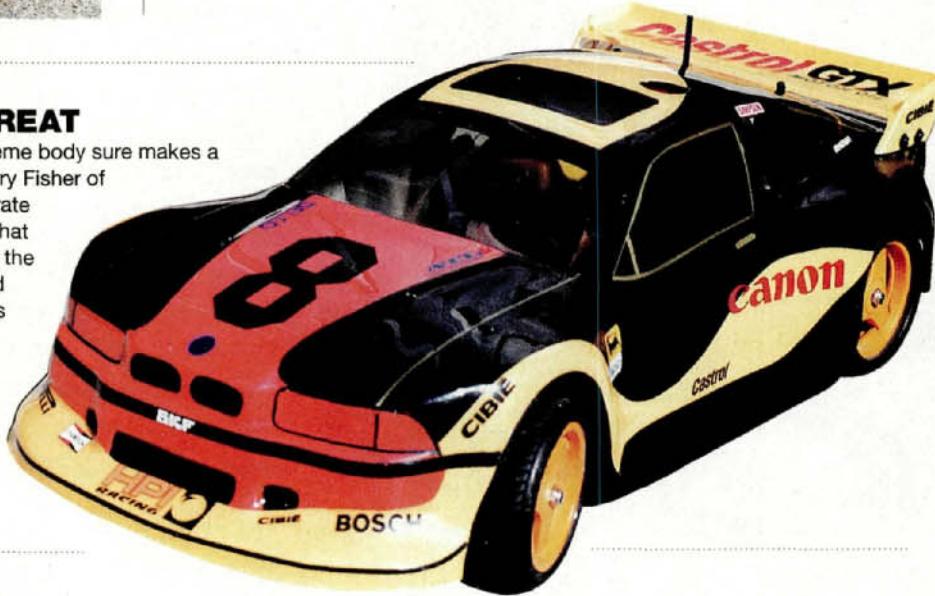


"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. If we choose to feature your creation, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the seventh annual "Readers' Rides of the Year Contest" in the fall of 1996. The winner will be awarded \$500 and an assortment of electronic R/C equipment furnished by Novak Electronics Inc. Our second and third choices will also receive an assortment of Novak electronic R/C equipment. In case we need to contact you, write your address and phone number on your letter and on the back of every photo you send. Good luck!



## TRAXXAS "TIMEX"

He's crashed it, he's bashed it! It takes a lickin' but still keeps on tickin'! Truoc Huynh's Traxxas Nitro Hawk has been through a lot, but the SRT paint scheme tells little of its pain. The truck has a hardened-steel, 18-tooth clutch bell, an aluminum flywheel and Pro-Line tires. Controlled by an Airtronics CS2P and heavy-duty servos, the Hawk faithfully rumbles on, surviving all the torture that Truoc can dish out.



## PRELUDE TO A RACE

This photo comes from Joseph Park of Northridge, CA, who has been racing for eight years. His latest racer is this Yokomo YR-4. A custom-built graphite chassis, supported by a Yokomo graphite upper plate, provides the basis for the car. Joe added a Tekin P-12 ESC and a Trinity Topaz motor. An Airtronics XL2P controls it all. Joe told us that the Yokomo Prelude body makes the car look like the real deal.

## PARKING-LOT SMOKER

This HPI RS4 is owned by Adam Johnson of Moorpark, CA. Full ball bearings, HPI Super Radial tires, a Tekin Rebel ESC, Airtronics radio gear and a Peak Performance Nightmare 24-degree motor are all hidden under the super-clean body. This equipment helps keep Adam in contention during local weekend races. He plans to start racing in the novice class during the next season. Good luck, Adam!



## KILLER T2

Kevin Hubbard of Meadows of Dan, VA, painstakingly painted and detailed his Associated RC10T2, the "Warrior of the Night." He won the Parma Killer-T body at the Fairy Stone R/C Speedway, modified it to fit the chassis' dimensions and painted on the stadium-truck look. His girlfriend, Tracy, hand-cut the logos and the lights out of strips of reflective tape. The truck is equipped with Futaba radio gear and a Tekin 610-G speed control, and it features MIP ball-bearing steering.



## DRAG KING

Jim Johnson of Macomb Township, MI, sent in this photo of his Parma '32 Hemi Coupe. All the details and scale characteristics shown are the result of three months of work. The eagle-wing-like flames, window tint and laydown antenna add up to a style that's unmistakably hot-rod. With its Novak reversing Rooster ESC and a Race Prep Purple Haze motor, Jim says his creation is as fast as it looks.



## LAUNCHER MAN

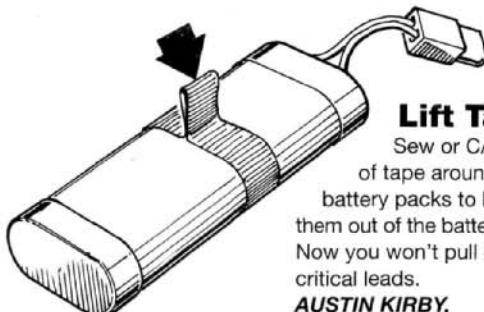
Chris Knight of Victoria, British Columbia, Canada, put his Associated RC10T to the test while setting up this shot. The airborne 10T has been modified with a DuraTrax gas conversion kit and custom brake lights, and it's powered by an O.S. CZ-RX engine. The 10T seems to be flying easily over the Tamiya Celica and Chevy S-10, which share a Novak Rooster ESC and an Airtronics steering servo.





## PIT TIPS

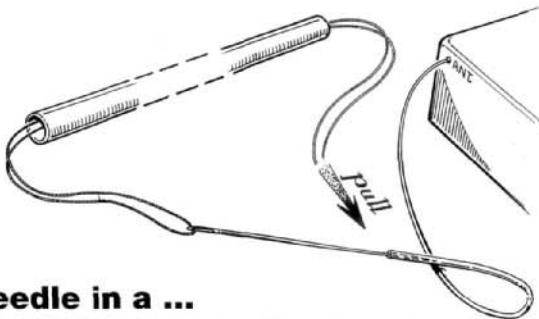
by Jim Newman



### Lift Tab

Sew or CA a loop of tape around your battery packs to help pull them out of the battery holder. Now you won't pull on those critical leads.

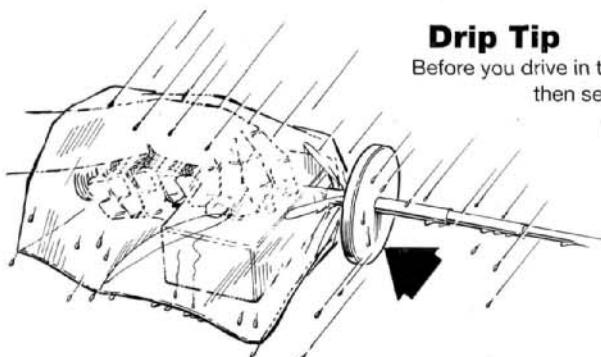
**AUSTIN KIRBY,  
Shippensburg, PA**



### Needle in a ...

Drop a needle and thread down the antenna tube, stick the needle into the end of the antenna wire, then carefully pull the thread and antenna wire up through the tube. Simple!

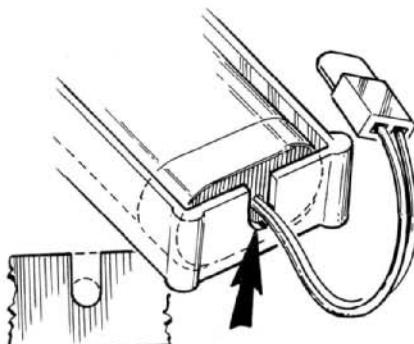
**DAVID FENWICK, Colonial Beach, VA**



### Drip Tip

Before you drive in the rain, place your transmitter in a plastic bag, then secure the bag tightly around the antenna with a rubber band. Punch a small hole in a waxed cardboard disc or a plastic butter-tub lid, then slide it down the antenna, on which it must fit tightly. Any raindrops that run down the antenna will be stopped by the disc and drip off, instead of going into the transmitter case.

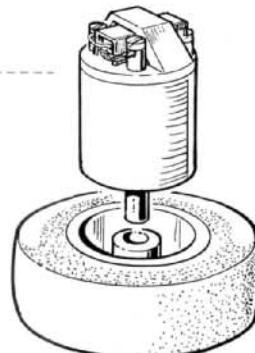
**ERIK NIELSEN, Midland, MI**



### Get Slotted

Replacement Ni-Cd packs can be a tight fit in the battery holder because of the leads. A cure is to slot the end of the holder to let the leads come out. Drill a hole first, then saw down to it to make a neat slot.

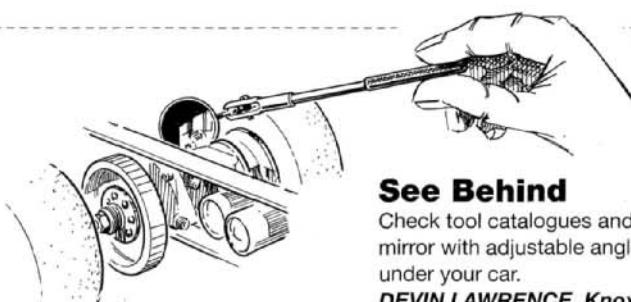
**ALEX LAMBERT,  
Camillus, NY**



### Wheel Stand

Need a motor stand in a hurry? A spare wheel will accommodate the motor shaft very nicely.

**JASON CORL, Garden Grove, CA**

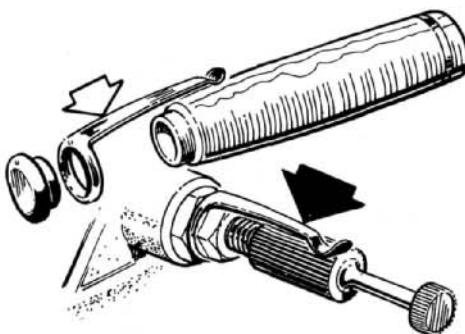


### See Behind

Check tool catalogues and flea markets to find an inexpensive dental mirror with adjustable angle—so useful for seeing behind, around and under your car.

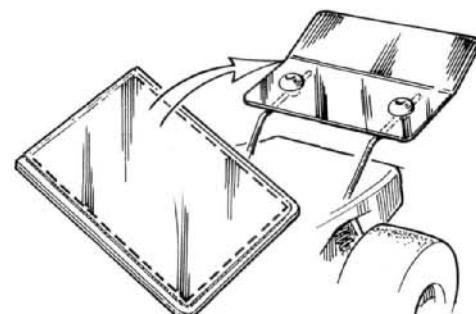
**DEVIN LAWRENCE, Knoxville, TN**

*Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.*

**Write Stuff**

If the needle-valve ratchet spring breaks, replace it with the clip from a pen top until you can get a spare.

**MATT McGUIRE,**  
*Palm Springs, FL*

**Baseball Wing**

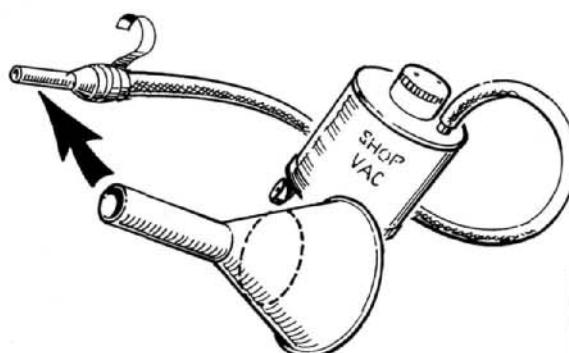
The clear plastic material from a baseball-card holder makes very good replacement wings. Just cut where shown by the dashed line to get two nice pieces. Bend them to the desired angle.

**MICHAEL HALE, Summerville, PA**

**Clean Hawk**

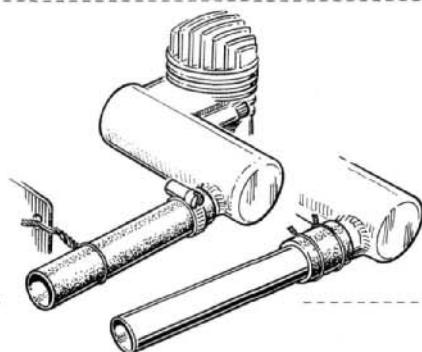
Tired of finding exhaust oil all over the back of his Nitro Hawk, Scott extended the exhaust pipe with rubber hose and a hose clip. An alternative, and lighter, scheme is to use thin aluminum tube held on by a short piece of hose with fine wire twisted around it. A twist of wire around a nearby bracket will also support the rear of the pipe.

**SCOTT LENNOX, Enid, OK**

**Big Sucker**

Cut down a plastic funnel, then tape it to the end of a shop vacuum-cleaner hose. The result is a small nozzle that will let you suck dirt out of the most inaccessible places in your car.

**TODD WELLS, Albertville, AL**

**Laced Up**

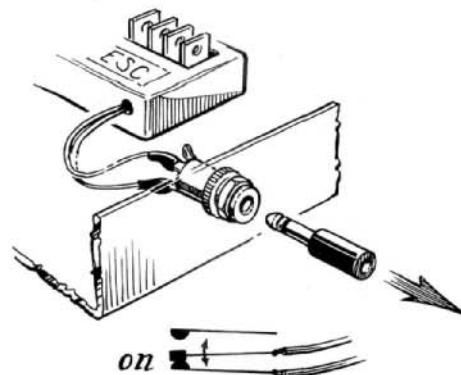
Free up a hand by using a broad boot lace as a transmitter wrist strap. Now you'll be able to carry your car, transmitter and a slice of pizza at once!

**SCOTT LERANTH, Big Bend, WI**

**Give it a Plug**

Instead of a switch, wire the ESC to a three-contact stereo socket. Use a meter to find which contacts touch when you pull out the plug, as the little circuit diagram shows. Mount the socket through the side of the chassis tub where it is easily reached, so you won't have to grope around inside for the ESC switch.

**BEN ESCOBEDO, Lyme, CT**





## TROUBLE SHOOTING

by John Howell

### Sand-Slinger

Your mag kicks butt, and you do a great job keeping it alive. I was fooling with my Team Losi Double-XT one day, and I noticed that the tires weren't spinning in opposite directions as they should. I've rebuilt the tranny twice and tightened and loosened screws, and nothing seems to make a difference. I'm about to throw the truck across the room. Does the tranny need more fluid or



a lubricant to help it run the way it should or what? I also have another question. I'm not sure if you are aware of Glamis in Southern California, but it's a place to drive dune buggies and off-road vehicles. The sand there is really soft and fine—more like a beach, but with much bigger hills. I'm going to take my truck there, and I wonder whether I should stick with the Pro-Line direc-

tional tires or use a slick, hard-rubber tire. Thanks for all your help!

**SCOTT MILLER**  
*MillerSpot@aol.com*

Hey Scott, here's the deal. First off, whip out your instruction manual and go to the section that involves the transmission (you still have your manual don't you?). Read over the section carefully, then disassemble the transmission and check the gears for signs of wear and tear. Are the teeth worn or chipped, or are some missing? If they are, you need to replace all the gears. What about dirt or debris?—any inside? If there is, again inspect the gears and check for damage. Replace them if need be.

Does the thrust-bearing assembly feel notchy or gritty? If it does, you'll need to rebuild that, too (actually, while you have the tranny already apart, it wouldn't hurt to rebuild it). Inspect the thrust balls and see whether they're "munched" (pitted, or otherwise damaged). If they are, replace them.

Next, check the thrust washers. If they're worn, you will need to replace them.

If you have to rebuild your tranny, a good reference to have on hand is Frank Masi's article "How To: Rebuild Your Transmission" (February '96). After the rebuild, your tranny should run much more smoothly.

As for your other question, all I can say is have a blast at the Glamis sand dunes! I'm well aware of it being a sand-lover's Mecca. Mount a set of Losi or Pro-Line hard-compound ribbed front tires; for the rears, I remember that Pro-Line once offered some paddle tires back in the day, but I don't know if they're still available. Call Pro-Line at (909) 849-9781 for info on the availability of paddle tires. If Pro-Line doesn't have them anymore, I'd try to make a set of paddle tires instead of going out with just regular spike tires. If you use standard spike tires, you'll just dig yourself in and get absolutely no forward bite.

Before you start slinging sand, here are a few more tips. Remember that the sand at Glamis is very, very fine and it will work its way into just about everything possible in your truck. Put your receiver inside a balloon, and before you run in the sand, take out all your bearings and clean them, but don't re-lube them. If they're all oiled up, they'll

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

attract that fine sand like crazy. If you run them dry, the powdery sand won't stick to them as much. Next, take the tranny out of your truck and run tape around the outside along the seam where the halves join. That should help prevent some of the fine sand from entering the tranny. Next, make sure that your gear cover is sealed tightly. You might even want to toss a bead of some sort of grease around the edge of the cover so you'll get a dirt-proof seal. Also, keep a close eye on your motor. All that fine sand will eventually find its way into the endbell and the rest of the motor. Once there is sand in there, it will be like running sandpaper inside the motor at 30,000rpm! Can we all say "wreak havoc"! As soon as you've finished running, completely tear your truck down and clean it like crazy (be sure to go over all your bearings and motor thoroughly). Have fun out there.

### Curb Cautious

My Tamiya S-10 slammed into a curb in front of my house. The truck is fine, but the collision disabled my

Rival 2PS radio system. I bought new batteries for

everything, but they didn't help. The folks at the place where I bought the radio say they only sell them—not repair them. I thought it was the crystals at first, but my dad said they are pretty durable. We opened the receiver and everything looked fine. My dad checked it out, and he thinks the voltage regulator might be bad.

What do you think?  
**STEVEN ROZSA**  
*Lebanon, OH*

Steven, a good way to avoid doing any further damage is

to stay away from that curb in front of your house! When you turn on your truck now, what happens? Do you get steering but no throttle, or vice versa? If either happens, then the radio and receiver might be fine, but you might have damaged your speed control or servo. Perhaps you damaged your receiver (that's a little more doubtful, though). A real long shot is that you might have damaged your motor and broken one of the brushes. Take your motor out and look at the brushes. If you

turn everything on and get nothing, then you've probably damaged your crystals. And let me tell you, crystals are not always the most durable little units on the face of the earth. Try buying another set of AM Airtronics crystals (don't forget to buy the right band—27MHz or 75MHz). If that doesn't work, give Airtronics a call at (714) 727-1474 and ask where you can send your radio to have it checked out.

## Cooked Connectors

Please help! I was driving my truck, and my battery connector melted to my speed control, and I can't separate them. What should I do? I have some connectors, but I don't know if they will work. What could have caused the meltdown?

**JORDAN FAUGHT**  
Wooster, OH

**Step one:** I assume that you use standard Tamiya-style connectors. If that's the case, they got hot and melted together because



they aren't the greatest conductors! Though they're easy to use and come standard on most entry-level batteries and ESCs, they don't allow current to flow as easily as other high-grade, low-loss connectors. Pick up a set of Deans Ultra Plugs, or any other high-quality battery connectors; they shouldn't melt.

**Step two:** carefully cut the two battery-pack wires, one at a time, and solder the new connector on one wire at a time. Don't cut through both wires at once, or you'll find yourself holding a pair of glowing cutters (can you say, "I'm looking like a miniature lightning rod?")!

**Step three:** cut that old connector off your speed control. It doesn't matter if you snip both leads at once on this one, though. Once it's off, solder on the new connector. Now you shouldn't have any more battery problems.

## Radio Runaround

I have a fully hopped up RC10T2 (Reedy 12-turn double, Novak Tempest ESC, JR radio, servo and receiver, Novak stutter-stop glitch control, Lunsford titanium tie-rods, MIP CVDs, RACETech and Trinity 6- and 7-cell battery packs, etc.), and I have tried everything to eliminate a nasty glitching problem. Nothing seems to fix it:

1. I changed all the electronics (motor, ESC, receiver/radio and servo).
2. I trued the comm on a lathe and replaced all the brushes with new ones and broke them in.
3. I re-tightened all chassis screws and other metal-to-metal screws.
4. I cleaned and reassembled the tranny.
5. I replaced worn tranny out-drives.
6. I repositioned the receiver, putting it in places other than next to the battery pack and farther away from the motor (over the servo or on the front shock strut with servo-mounting tape or Velcro®-

brand fasteners).

The problem is always present in the turns, usually farthest from the point where I stand on the drivers' stand (only about 30 feet away), and I noticed that it happens even when the throttle is in the neutral position. It seems like radio interference or lack of signal power, but as I said before, I have tried other radios (new ones) with fully charged batteries, and nothing works.

No one else on the track experiences similar problems except when they have specific equipment failure. What else can I do? Replace the whole car? Switch hobbies? I'm desperate! Please help.

**ENRIQUE M. FERNANDEZ**  
Miami, FL

Wow ... it sounds as if you've gone through all the normal troubleshooting techniques and then some, Enrique. It sounds totally bizarre! As I understand it, you've tried new radios. Did

## Gear-Grinder

I have an electric Traxxas Stampede, and it's a cool truck, but the idler gear always grinds, and I have to keep replacing it. What's the problem? Even if I take off slowly, it still ends up grinding. Would a Traxxas machined-aluminum gear stop the grinding for good? And are there any steel idler gears available? If there are, could you tell me where to find them?

**KURT PITTATSIS**  
Lakewood, IL

Kurt, you did replace the other tranny gears when you installed the new idler gear, didn't you? If you didn't, then that could be the problem. When your idler gear gets a little crunchy, it also affects the other gears in the gearbox. So, if you replace the wasted idler gear with a new one, and your top gear and diff gear are still a bit tweaked, it won't take long until they start to chew up your brand-new idler gear—which, as you've found out, is a bad thing! At this point, it's a recurrent theme: toss in another one, and the next thing you



know, your gearbox sounds as if it has Cap'n Crunch inside it. My advice is to tear down your tranny and inspect your top shaft and diff gear. If they look chewed up, notched, or otherwise damaged, you need to replace all the gears inside. I wouldn't worry too much about the steel gears. Once you get your gears smoothly meshed again, you shouldn't have too much of a problem. Also, check out Traxxas' slipper-clutch assembly for your truck. It will help take off a lot of extra stress on your gearbox. If, for some reason, you can't get your truck back up to speed, contact Traxxas at (214) 613-3300 and tell them your dilemma.

thing: get that receiver off your servo or wherever it might be right now; it should be attached with Velcro to the bottom of the chassis on the side opposite your ESC. Well Enrique, I'd be lying if I said I could accurately nail down the problem without seeing your truck. My best advice is to send the radio and receiver back to Horizon at (217) 352-1958 to have it "tuned up." Good luck, my friend. If you find out what the problem is, drop me another line and let me know what it was—just don't give up. It might be frustrating, but it's fixable.



*Tim Newman*



# The Revenge of the Funkmobile

**H**AVE YOU EVER wished that you could design and build your own car? If you took the very best features of all the designs you had seen, built and used, you could put together a rolling chassis that would beat the competition, daze your fellow racers and bring you fame and fortune. Pretty neat daydream, don't you think? The simple reality, however, is that few of us have the design skills, manufacturing capability, or ambition to bring a project like this to fruition.

Enter one Matt Jarrett: gourmet chef (by occupation), husband, father and part-time R/C Formula 1 racer. Matt started coming to our weekly club races about nine months ago. He was running an older Tamiya\* 101 series chassis, but it was obvious from the start that this guy was pretty talented. After just a few weeks, he had improved to the point at which he was winning the B-Mains regularly. But he felt that he needed a more competent, carpet-oriented chassis to duke it out with the fast guys.

He couldn't really afford to purchase a new one

(remember the husband and father part?), so he set about

making a car from spares, available materials and donated parts.

## UGLY DUCKLING

Lo and behold, several weeks later, Matt showed up with what had to be the most singularly ugly F1 car I have ever seen. Its backbone is a white-painted marine fiberglass

**Matt used marine fiberglass to make his car's chassis. It isn't very pretty, and he could have done a better job of cutting it out, but it's extremely stiff and durable.**

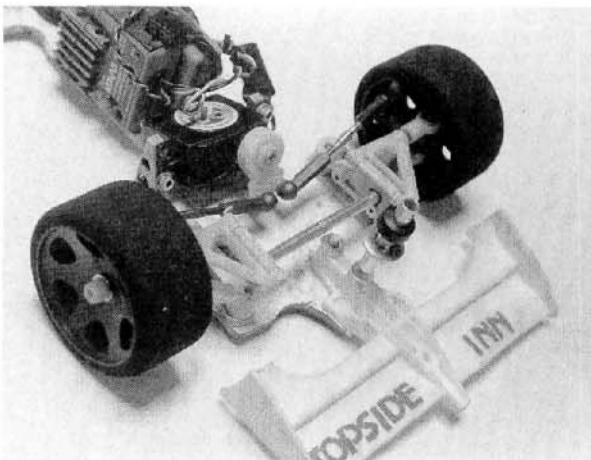
wire on the rear pod. Let me tell you, folks, it was a real giggle. True to its stellar good looks, Matt struggled with it all night long. Several of us encouraged him to keep

very fast laps. Don't ask me how he was able to do it because I still don't understand what happened from one week to the next. Matt said that he really didn't change much; he just took it all apart and put it back together again. So maybe he simply did a better job the second time around, or perhaps the parts fit together better than the first time. Whatever. All I can remember about that night was that, once again, several racers came over to his pit area to check out the car. Only, this time, they weren't there to give him advice but to try to figure out what had made it so fast!

## HOW HE DID IT

Two weeks later, Matt finished third in the A-Main, and he has been in the top five almost every week since then—same motor, same batteries, same electrics, same driver. I decided to take a closer look at what Matt had done and to try to come up with some answers for *R/C Car Action* readers.

Matt started with a piece of thick, stiff, marine fiberglass that he got free from a local boat repair shop. Unlike what we usually see in R/C, this stuff is smooth on only one side; Matt cut it so that the smooth side



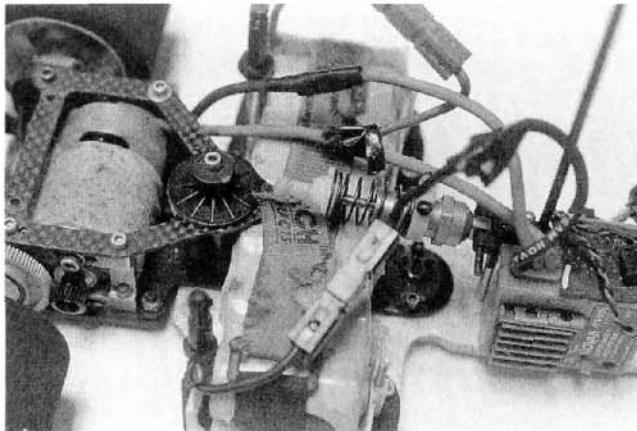
**The front end was drilled to accept an HPI front wing and Associated pan-car front-suspension parts. The little tube between the arms prevents the suspension from being deflected in tight turns.**

chassis (Matt's employer, The Topsider Inn, is on the western shore of the Chesapeake Bay, so boat scraps were easy to come by). Other assorted parts come from the Associated\* RC10, 10L and 10LSS, and it's topped off with an HPI\* F1 body, a handmade Kydex front wing and an old BRP\* off-road wing mounted with wing

trying to tune the beast, offering what limited information we could based on what we knew about the parts he had used to construct his chassis. That night, he finished last in the C-Main, and we thought we had all seen the last of what we had called the "Funkmobile."

The next week, Matt came back with his funny-looking contraption, won the B-Main and also ran a number of very,

**Matt Jarrett and his creation. His ugly duckling may never become a swan, but it's in the top 10 every week!**



**Note the creative manner in which the rear shock absorber is mounted: bolts, tube, mount, bubble gum, baling wire .... The rear pod is a stock Associated piece, but the batteries had to be elevated about 3/8 inch for the T-bar to work properly.**

would face down toward the carpet and the rough side would provide a surface on which to attach the electronics. He measured the dimensions of his Tamiya 101 car and used them as a general guideline for the new car's wheelbase, but it's also very close to that of the Associated 10LSS. Because he used a narrow Associated front end, all he had to do was position the mounting holes for the suspension uprights the proper distance apart. He then mounted a Futaba\* 132 SH steering servo up front and tied it all together with some turnbuckle linkage for full toe-angle adjustability. The Associated suspension arms are fairly short when compared with other F1 designs, so unlike HPI, Kyosho\*, or Tamiya F1 cars, the chassis plate sticks out a bit from the sides of the body's nose. As you can see, however, aesthetics were not really Matt's priority.

Out back, Matt mounted an Associated 10LSS rear pod, complete with the original, nylon, left side upright, and a fiberglass rear axle and differential. To protect the spur, he used a lower pod plate with a kick-up. Because both the front and rear ends use pan-car-size wheels and tires, finding suitable foam was no problem, and it was very inexpensive. This was another major reason Matt used the Associated parts. He hasn't tried narrowing the rear tires but says he may do that in the future to try to reduce rear bite. The original scrap Kydex front bumper lasted a week or so before he replaced it with an HPI

piece for more downforce (also, the flat Kydex kept getting stuck under the corner barriers). He eventually tossed the original BRP rear wing in favor of a more scale-like HPI wing and lower mount. The car still wasn't pretty, but it did look more like an F1 car.

The real problem was with the batteries. Both the Kyosho and Tamiya cars use a chassis with a cutout around the T-bar stem; this cutout allows the bar to be mounted flush with the chassis plate, and the batteries run crosswise over it. Associated's design, however, uses a flat, solid chassis plate, which is meant to be used with saddle-pack-style cells. Rather than chop his LTO-style packs up, Matt decided to figure out a way to make them fit. He used a pair of shortened RC10 battery cups and placed thin spacers under each one to raise the batteries over the T-bar stem. This allows the batteries to fit sideways in the F1 shell, but the T-bar still has sufficient space to lie flat properly. You'd think the batteries would be so high that they'd impede the car's cornering ability, but they don't. An older Novak\* 410 MC speed control and Polaris receiver completed Matt's Frankenstein creation.

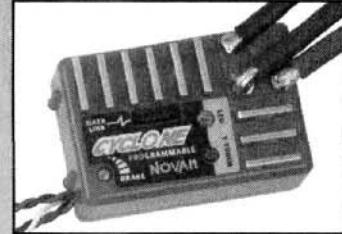
I'd like to say that Matt had some sort of profes-

sional technical design training or experience or that he used drawings of full-scale racers when he set up his project, but he didn't. Instead, I have to admit that he followed his instincts when he built this car, using what was available to him at no cost or low cost (he literally had boxes of Associated stuff left over from his oval-racing days). Following Matt's progress with this car from week to week has been kind of inspirational to me. Everyone laughed when he showed up with the car for the first time, but nobody's laughing anymore. Every time he wins the A-Main, we call it the Revenge of the Funkmobile.

Do you or one of your racing buddies have a "Funkmobile" at your local track? If you do, we'd like to see some of the more wacky designs that are hitting the tracks out there. Write to me and let me know—attention R/C Doctor at 100 East Ridge, Ridgefield, CT 06877-4606—or email me at xsnf09a@prodigy.com.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

**NEW FROM NOVAK**



## THE FUTURE IS HERE!

Once again Novak has designed a product that truly surpasses the competition. The **Novak Cyclone** is a fully programmable, microprocessor controlled speed control using state of the art components to deliver the best possible performance with the **smallest size** (1.73" x 1.10" x 0.79") and **lightest weight** (1.44 oz.).

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- **Three times as many discrete steps as the competition** (256 discrete steps for forward and brake band). This translates into the smoothest trigger response available (0.39% per step).
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- **Built-in powerful 3 amp BEC circuit**, to power the radio system and most power-hungry servos without the need for an external receiver battery. The BEC circuit is fully protected from overloads and overheating.
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- **Adjustable minimum brake** can be set from 0 to 75% with the use of a simple adjustment pot.
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## Novak Duster II Sport

**N**ovak's newest release, the Duster II Sport, is classified as a sport speed control. It has features such as One-Touch Set-Up™ programming and massive purple heat sinks. Polar Drive Technology™ is one of its most important new features.

Polar Drive ensures that the speed control will run cool; this means that very little power is wasted by the speed control. A "keep it brief and simple" explanation of Polar Drive Technology centers on FETs' rise and fall times and FET drive voltage.

An ESC acts as a throttle by switching the battery voltage to the motor on and off. At half throttle, for example, the FETs would be on half the time, deliver half the available battery power to the motor and cause the motor to run at half speed. When the FETs are off, no current is flowing, so they are dissipating zero power. When they are fully on, current is flowing heavily, but at full on, FETs have very low resistance and therefore dissipate very little power. The scrub comes in when the FETs are switching from on to off or off to on. As they switch, they go through the linear analog range of the FET. At this point, the FETs have very high resistance, and therefore they are heating up; this could spell disaster, but the FETs switch quickly, minimizing the heating. Novak engineers have decreased the rise and fall times as much as is technically

practical so that the FETs dance around between the off and on states; they don't stay in the high-resistance linear analog range long enough to overheat.

Because the MOSFETs are switching fast, the switching action tends to produce large amounts of radio noise. If this noise is not controlled, it would reduce the radio range to just a few feet. Novak Electronics' engineers came up with several new tricks to control this noise level and, at the same time, keep the switching speed high. By adding several special capacitors, a unique PCB layout and exact placement of power wires, they were able to reduce this noise level to less than what slow-switching (low-frequency) speed controls produce. With this technology and HYPERFET transistors, the Duster II delivers a high level of performance, which means a cool-running speed control—hence the name Polar Drive.

Instead of screws, its case is held together with two O-rings that can be easily popped off with a small screwdriver. Inside, I saw Novak's two-printed-circuit-board (pc board) construction. Most of the control circuitry is on the smaller board; the FETs and the BEC voltage regulator are on the larger one. The two boards are connected by eight riser wires. All the motor, battery and receiver wires are also attached to the main board. As always in a Novak speed control,

all the solder joints and components are computer-grade.

### TEST 1— RESISTANCE

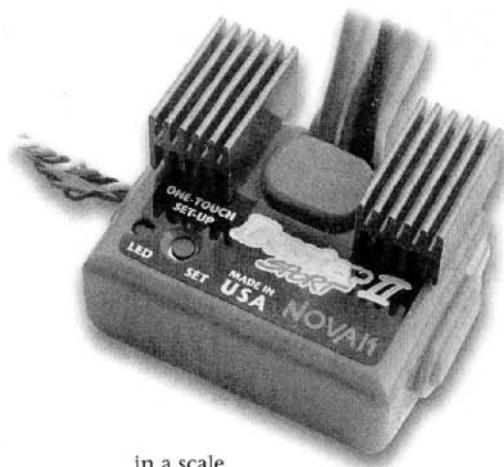
First, I measured resistance. One would expect that Novak would use low-resistance FETs to go with its Polar Drive because the Duster II has an advertised resistance of 0.0023 ohm. My measured resistance always turns out to be higher than the advertised one because the specified number is the resistance of the FETs only. The number that I come up with is all inclusive of the FETs, solder joints, pc boards and wires.

To measure the Duster II's resistance, I passed a constant 12 amps of current through it. While the current was flowing, I measured the voltage drop across the controller; then I calculated the resistance by dividing the voltage drop by the current flow.

- Voltage drop along the full length of the battery wires and motor wires: 0.21—a resistance of 0.017 ohm.

- Voltage drop 2 inches along the wires: 0.06 volt—an impressive resistance of 0.005 ohm.

The 3.5-to-1 difference in the two readings points out the importance of having short wires and good connectors if you plan serious racing. If your intended use for the Duster II is fun running, or if you plan to install it



in a scale car or truck because of its working brake lights (more on these later), the Tamiya and bullet connectors work great.

### TEST 2— OVERHEATING

Next, I subjected the Duster II to the let-it-cook test. I adjusted the current to 20 amps and let the controller handle this load for 15 minutes. I ran this test with the heat sinks in place, but I did not provide any cooling

## SPECIFICATIONS

### DIMENSIONS

**HxWxL** ..... 1.6 x 1.36 x 1.93 in.

**WEIGHT (w/ wires and heat sinks)** ..... 2.2 oz.

### TUNING

**Access to controls** ..... Excellent  
**Ease of adjustment** ..... Excellent

**LIST PRICE/WARRANTY** ..... \$129/90 days

### ELECTRICAL (Mfr.'s specs)

<b>Max. voltage</b> .....	10 cells
<b>Min. voltage</b> .....	4 cells
<b>Continuous current</b> .....	210 amps
<b>Resistance</b> .....	0.0023 ohm

### TEST PARAMETERS

<b>Voltage</b> .....	6 volts
<b>Current</b> .....	12 amps

### Voltage drop

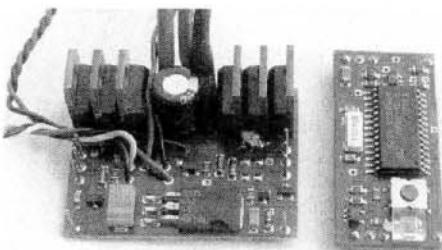
— along full length of battery/motor wires .....	0.21 volt
— 2 in. along wires .....	0.06 volt

### Calculated resistance\*

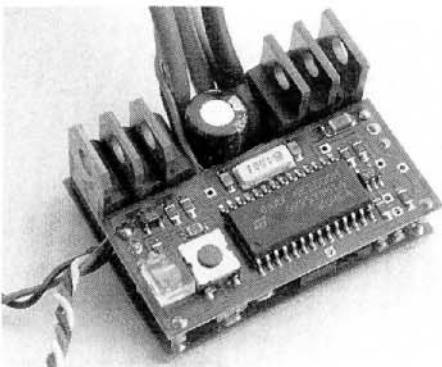
— along full length of battery/motor wires .....	0.017 ohm
— 2 in. along wires .....	0.005 ohm
<b>BEC output, 6-cell pack</b> .....	5.66 volts

\*Resistance = Voltage drop + Current

**COMMENTS:** an easy-to-use, well-priced sport speed control that is suitable for racing because low resistance and Polar Drive mean cool running; features include One-Touch Set-Up, Radio Priority Circuitry and a brake-light kit that works well and adds exciting realism.



**The Duster II's internals consist of two printed-circuit boards. The control circuitry is on the smaller, top board (right), and the FETs, BEC regulator, motor, battery and receiver wires are mounted on the main board (left).**



air—the equivalent of dumping five battery packs through the controller without air cooling. After 15 minutes, the heat sinks were warm—only a little uncomfortable to touch. With a little cooling air, this Duster's low resistance, and Novak's Polar Drive

## WHAT IT HAS

- Forward (no reverse).
- 5 FETs (3 for forward, 2 for brakes); Schottky diode (for noise suppression).
- One-Touch Set-Up™.
- Brake-light drive circuitry.
- BEC.
- Reverse-voltage protection.
- Thermal-overload protection.
- Radio Priority Circuitry (ensures control even when the battery is dumping).
- Polar Drive Technology™ (keeps everything running cool).
- Tamiya-style battery connectors, bullet battery connectors and adaptable receiver connector (adapts to fit all popular radios).
- Instruction sheet, heat sinks, motor capacitors, brake-light LED kit, motor wires, One Touch Set-Up™ push tool and killer decals.

Technology, the Duster II should be able to handle almost any motor with jammin' performance, yet stay cool.

### TEST 3— SHORTING OUT

For a final test of its toughness, I jammed a short across the Duster's motor leads. The current jumped to 40 amps (the limit of my bench supply). I let the Duster II run in this mode for a minute (a real test of the Polar Drive). A quick check of the input voltage to the Duster II measured it at 2 volts—way below the recommended 4-cell minimum of 4.8 volts—yet the Duster II never complained, and it handled the 40 amps with very little heating.

### ROAD TEST

With the Duster II mounted in my MRC MT-10S truck, I matched it to my Magnum AM radio. With the One-Touch Set-Up system, this took all of five seconds.

From the very first run, it was evident that the Duster II is one mean, sport-style speed control. Thanks to its high-frequency motor drive, it is totally smooth in the slow and mid ranges. Its very low resistance translated to wheel-spinning acceleration and great top speeds. Strong brakes made 180-degree stop-and-go turns a blast. I did a lot of braking to watch the super-bright brake lights burn. Apparently, the BEC is well-filtered because when I drove the car far down the road, I did not experience any glitching or radio interference.

The instruction sheet noted a feature called Radio Priority Circuitry that will provide control

of all radio functions even after the battery has dumped. To test it, I drove the first battery to a complete dump.

Although the battery pack was so drained that the car could barely move, I still had full control over the steering and the throttle. I continued to run the car until it stopped; not once did the steering glitch or falter. This feature works extremely well and will keep the steering working as you struggle to cross the finish line with a dumped battery pack.

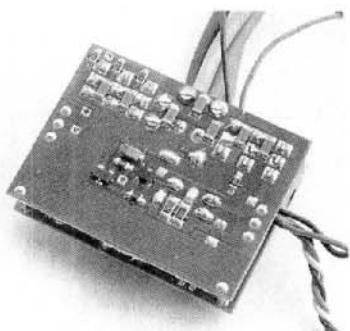
For the second run, I tried a 7-cell hump pack. Everything was the same as with the 6-cell pack, except that my MT-10S was much faster.

Throughout the runs, the Duster II provided fast acceleration, excellent top speed, good brakes and outstanding run times. A check of the heat sinks at the end of each run (6- and 7-cell), showed that the Duster II is a cool-running speed control. The heat sinks were barely above room temperature.

### BEAUTIFUL BRAKE LIGHTS

One of the coolest features of the Duster II is its LED brake-light kit. I have worked with light-emitting diodes (LEDs) for many years now and have seen some really bright ones come on the market. When I realized that the Duster II included the brake-light kit, I had to try it out "right now." It took very little time to hook it up, and the lights

are bright. The good news is that LEDs use very little current, and because these brake lights are on only when you are braking in neutral, I doubt that you'd be able to measure the reduction in run time. All you scale enthusiasts and customizing buffs should find this feature almost irresistible; it alone makes the Duster II new and exciting.



**The bottom of the main board shows very clean spot-welds—a sign of top-notch workmanship.**

### CONCLUSION

The Duster II is classed as a sport speed control, but back in '89 when I first started this column, I would have given a bundle for a "pro" model racing-speed control that behaved as well as it does. Novak's Polar Drive Technology truly keeps the FETs running cool under conditions such as lots of throttle action, heavy acceleration and a dumping battery pack. Give the Duster II a try if you are looking for a controller that has killer performance.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

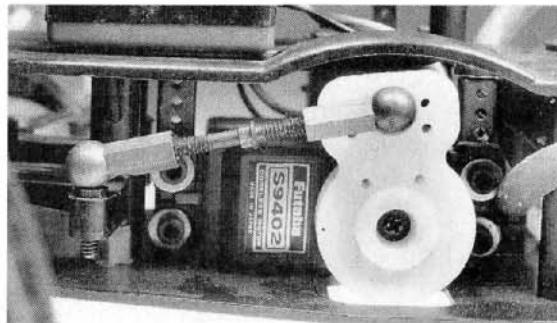


# Eliminating Suspension and Steering Slop

**E**XCESSIVE SLOP, or looseness, in the suspension and steering of off-road cars and trucks is a common problem, especially for rides with a lot of miles on them. Over time, dirt, cleaners and lots of off-road abuse can make even the tightest, best-kept suspension sloppy. This month, I'll cover some tips and techniques

steering linkage, i.e., the servo arm, tie rods, bellcranks and even the servo's gears, have become so worn that they no longer fit together tightly.

• **Symptoms.** After negotiating turns, the car fails to straighten out with authority. To test for this, turn the car to the right and then let go of the



**The first place to check for steering sloppiness is in your car or truck's steering assembly and linkage (primarily the ball cups, bellcranks and servo savers).**

that will tighten all those well-worn suspension and steering parts and make your ride like new again.

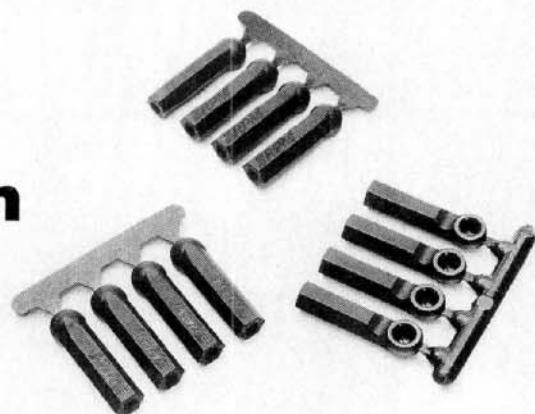
## STEERING SLOP

- **Cause.** Steering slop occurs when the parts of your car's

steering wheel. If the car continues to turn right, you have problems. Just to make sure that the problem isn't caused by misalignment of the front wheels, turn the car in the opposite direction, and again let go of the wheel. If the car continues to turn left, that proves that the wheel alignment is not causing the problem.

- **How to fix it.** Before you fix the slop, you need to identify its source. To check ball joints and ball cups, hold

one of the front wheels with one hand and grab the tie



**Once a small bit of dirt gets between your ball cup and ball stud, they start to slowly wear out. Imagine two pieces rubbing against each other with a fine layer of dirt separating the two, and you get the picture.**

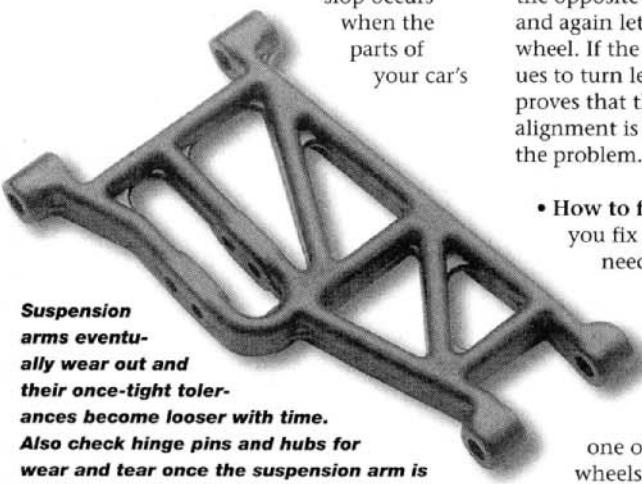
rod with the other. Try to wiggle the tire back and forth while you watch the ball joint/cup connection. If you can see the ball move from side to side inside the cup, one of the two (or both) is worn out. Replace the ball cup with a new one and repeat the wiggle test. If the ball continues to move inside the cup, the ball joint should be replaced. You can do this test on all the ball joints and cups in the steering assembly. Chances are if one is worn, they all are.

**Tip.** When it's time to replace your stock ball joints or ball cups, you may want to consider MIP's\* oversize BJ Ball Ends and RPM's\* heavy-duty ball cups. When they're new, larger ball joints are a bit tighter than standard ball joints, and this makes for a zero-slop fit in the ball cup. RPM's ball cups have a deeper socket and thicker walls, and this

means more of the ball end is covered by the cup to produce a tighter fit.

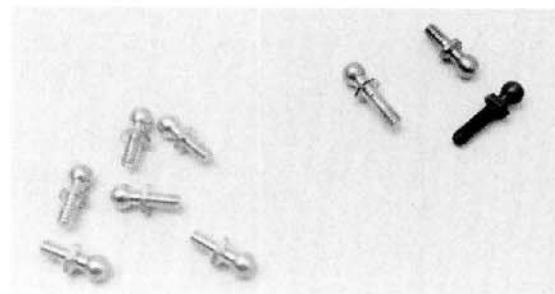
The next parts to test for slop are the bellcranks and servo-saver. This is also a visual test. If your car has a built-in servo-saver in its bellcrank assembly (such as the type on Associated and Losi cars), observe the top of the servo-saver as you try to turn the bottom part. There should be no slop where the two pieces come together. If there is slop, you can try to eliminate it by tightening the tension adjustment nut that holds the assembly together. If this doesn't do the trick, replace the bellcrank assembly.

To test a servo-saver on the steering servo, such as the type made by Kimbrough\*, try to move the servo-saver back and forth while you watch the screw that attaches the servo-saver to the servo. If the servo-saver moves and



**Suspension arms eventually wear out and their once-tight tolerances become looser with time.**

**Also check hinge pins and hubs for wear and tear once the suspension arm is off your vehicle.**



**If you need to replace your ball ends, you should also replace the ball cups so that you get the tightest tolerances possible.**

the screw head doesn't turn, the servo-saver is worn out and should be replaced.

#### SUSPENSION SLOP

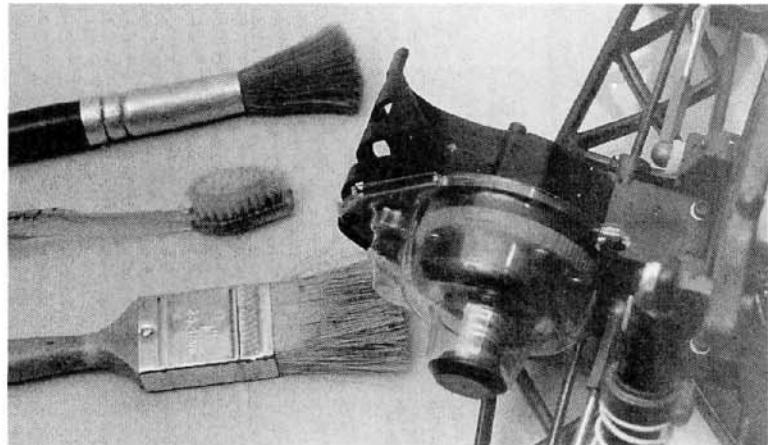
- **Cause.** Suspension slop occurs when your car's suspension pieces, i.e., its suspension arms, mounts, hinge pins, hub carriers and steering arms, become worn and no longer fit together tightly.

- **Symptoms.** If your car's suspension has a lot of slop, it will handle inconsistently. Whenever you notice poor handling that you just can't explain, chances are the problem is excessive suspension slop.

- **How to fix it.** First, determine where the slop is coming from. Testing for suspension slop is easy: grab each suspension piece and try to move it while keeping a close eye on its mounting

points. For example, shocks have a tendency to wear out first at the shock-tower mounting point. Grab the top of the shock and move it from side to side. If it moves, you should replace the plastic bushing that sits between the shock cap and the mounting bolt. Do the same test at the shock's base.

Suspension arms usually last a long time, but they'll eventually wear out. Hold the outside end of the arm and try to move the front or rear of the tire away from the chassis while you observe the hinge-pin mounting location. If there is any movement at all, the arms must be replaced (always replace them in pairs). If just the arm slides back and forth on the hinge pin, all is not lost: place a thin washer between the A-arm and the A-arm mount on the hinge pin.



**You can help prevent slop by keeping your vehicles clean. Get in the habit of regularly maintaining your ride; it will be a more consistent performer, and it will last longer**

This will prevent front-to-back movement.

**Tip.** Trinity\* makes a neat suspension shim kit (part no. PK3004) that consists of a bunch of little washers and O-rings that you can use to eliminate slop from just about any suspension part. Although the kit is intended for use on Losi vehicles, it will work on any car that uses  $\frac{1}{8}$ -inch-diameter hinge pins.

#### PREVENT SLOP

Some slop can be prevented by following these simple steps:

- Keep your ride clean. Dirt and grime act like sandpaper on moving parts. At the end of the day, use a toothbrush to clean out heavily soiled areas, and if need be, pop the ball cups off to wipe off the ball joints. A Q-Tip works well to clean out ball cups.

- Once a month or so, remove the hinge pins and clean them with motor spray. Pipe cleaners do a great job of cleaning out A-arm mounts.

- While you have things taken apart, dismantle the servo-saver in the bellcrank and wipe it down. Not only will this slow wear, but it will also allow the saver to work better in the event of a crash, possibly saving your expensive servo gears.

#### SUMMARY

There isn't a lot involved in checking suspension and steering components for slop, but it is vital that you keep tabs on it.

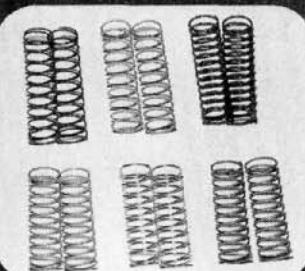
Excessive slop in the areas I've discussed can make for a mean-handling and not-so-fun-to-drive car or truck. Isn't fun the reason we all do R/C?

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

## QUESTIONS & ANSWERS

### How are off-road shock springs rated?

Springs are rated in pounds per inch—in other words, the number of pounds it takes to compress the spring  $\frac{1}{2}$  inch. For example, if it takes 2 pounds to compress a spring  $\frac{1}{2}$  inch, the manufacturer rates that spring at 2.



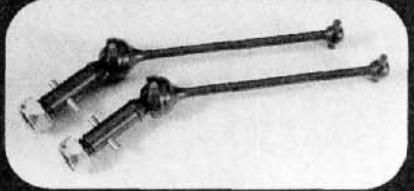
### Why do some companies use plastic nuts to hold the wheels on?

Many vehicles have aluminum axles. If you thread an aluminum nut onto an aluminum axle, more than likely, the nut and axle would become damaged or seize.



### I keep losing the drive pin in my MIP CVDs. Is there a "fix" for this?

There sure is. When you build your CVD shafts, apply a little mild thread-locking compound to the small setscrew that secures the pin.





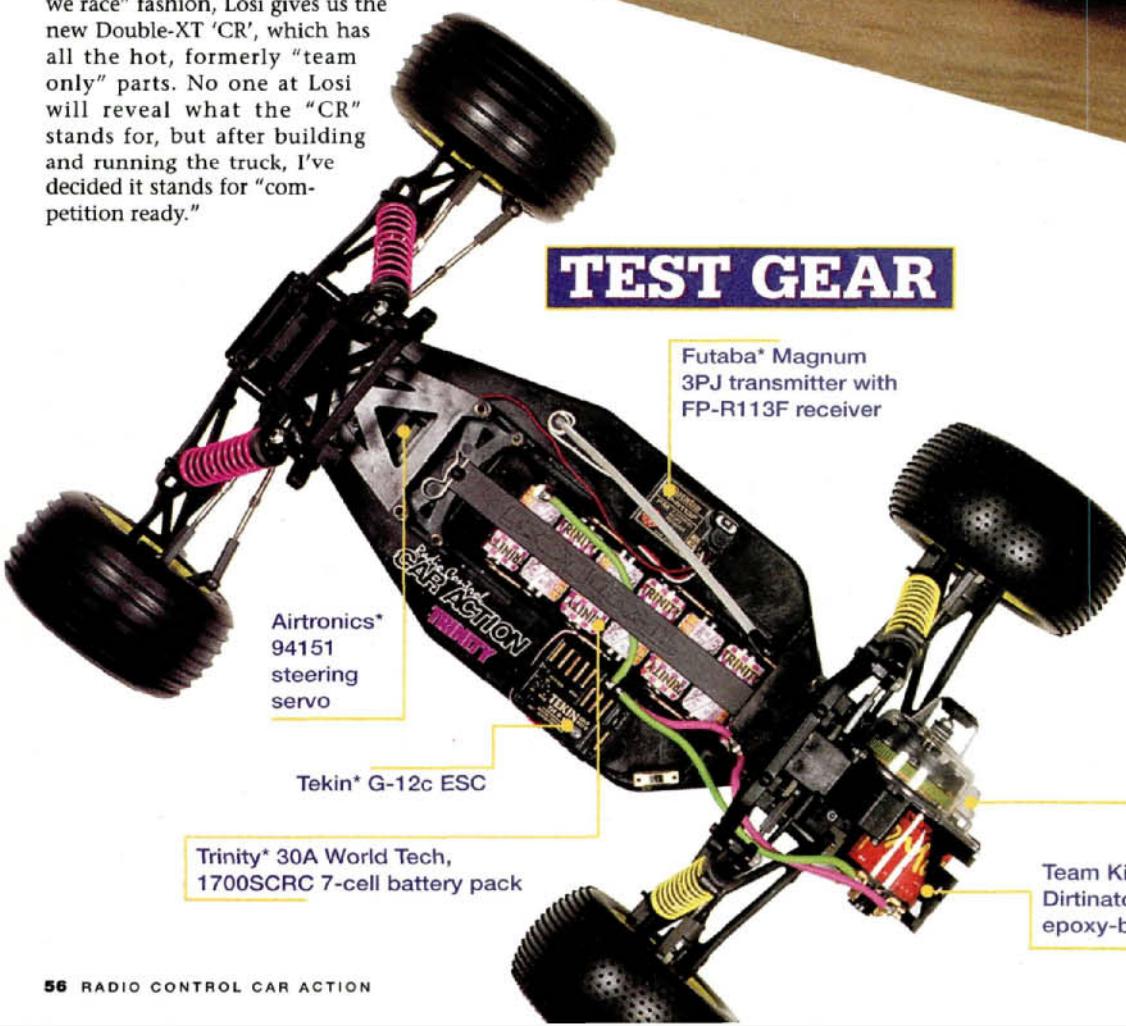


## TEAM LOSI Double-XT 'CR'

by Frank Masi

**W**HAT'S THAT old saying about leaving well enough alone?—or something to that effect. I'll tell you: that one certainly isn't in Team Losi's\* book of proverbs. You'd think a company that makes a racing truck as successful as the Double-XT would kick back a little and rest on its laurels. But quite the contrary, it's pretty obvious that Losi hasn't rested on *anything* since its very first racing buggy kit, the JR-X2, burst onto the scene in '88.

During the past year, Losi team drivers tested several modified chassis and suspension pieces for the Double-XT with great results. And now, in true "sell what we race" fashion, Losi gives us the new Double-XT 'CR', which has all the hot, formerly "team only" parts. No one at Losi will reveal what the "CR" stands for, but after building and running the truck, I've decided it stands for "competition ready."



### TEST GEAR

Robinson  
Racing\*  
17-tooth,  
48-pitch  
Silencer  
pinion gear

# Competition Refined



## KIT FEATURES

The new CR retains many of the features that made the original Double-XT a racer to be reckoned with. Its chassis and suspension are made of Losi's exclusive Stiffezell composite. Easy-to-bleed, hard-anodized shocks are used at all corners, and the CR comes with Losi's patented Hydra Drive traction-control system.

When racers first see the CR, they almost always ask, "So, what's new? It looks just like a Double-XT." A lot is new, but most of the changes are subtle ones that you might not notice until you're on the track.

• **Stretched chassis.** The most noticeable difference between the regular Double-XT and the CR is their chassis. The CR uses Losi's new "XL" (extra-long) chassis; it's 0.300 inch longer to provide better handling on bumpy

**SCALE** ..... 1/10

**LIST PRICE** ..... \$359.95

## DIMENSIONS

Length overall ..... 15.875 in.  
Wheelbase ..... 11.4 in.  
Width (F/R) ..... 12.5/12.6 in.

## specifications

**WEIGHT** (gross, RTR) ..... 4 lb., 3.1 oz. (7-cell battery)

## CHASSIS

Type ..... Three-piece modular  
Material ..... Stiffezell

## DRIVE TRAIN

Type ..... 3-gear, sealed trans. (2.61:1 ratio)  
Primary ..... Pinion/spur  
Transmission ..... Universal-joint shafts  
Differential(s) ..... Ball  
Slipper clutch ..... Friction with Hydra Drive  
Bearings/bushings ..... Sealed ball bearings

## SUSPENSION (F/R)

Type ..... Independent A-arm w/adj. camber link  
Damping ..... Oil-filled, coil-over shocks

## WHEELS (F/R)

Type ..... One-piece plastic  
Dimensions (DxW) ..... 2.2x2 in.

## TIRES

Front ..... Silver compound Directional rib  
Rear ..... Silver compound IFMAR pin

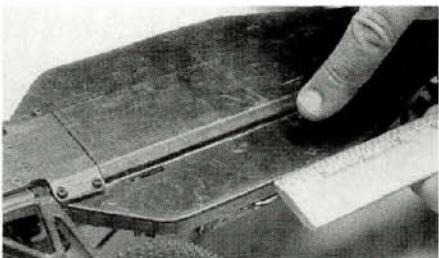
## ELECTRICS

Motor, battery, ESC ..... Not included

## DOUBLE-XT 'CR'

sections and to improve steering at high speeds and when on power.

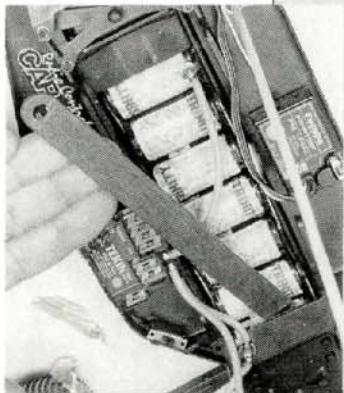
A molded battery-hold-down strap is also new. It replaces the previous hook-



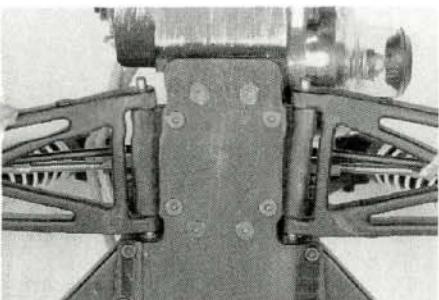
The new chassis is 0.300 inch longer.

and-loop tape straps, it holds the pack much more securely, and it makes those last-second, "Oh, no! My heat is starting" pack changes much less stressful.

**Rear suspension redo.** Usually, a longer chassis results in reduced steering. However, new rear-suspension geometry ensures that the CR not only steers as well as the shorter-chassis Double-XT but actually exceeds it in many conditions.



The molded battery hold-down strap is a welcome addition.



A wider rear pivot plate places the rear toe-in inboard.

A new, two-piece rear suspension plate and arm mount replace the older truck's one-piece plate. All of the truck's rear toe-in (3 degrees on each side) is now located at the arm mount instead of at the hub carriers. This new "leading arm" design is perhaps the core of the CR's enhanced handling. It allows the truck to accelerate much harder when exiting turns, so you'll be able to get on the throttle much sooner. It provides more off-power steering, so you won't have to brake as hard or slow down as much to make tight turns. Also, the new rear suspension provides greater stability during braking; when you dive into a turn and hit

# Building & Setup Tips

The Double-XT CR comes in kit form with its parts neatly bagged according to each building step—unlike some other kits that require you to open more than one bag at a time, which can cause confusion and lost parts. The instructions are among the very best. I used to think that no other company's instruction manuals could rival Tamiya's\*, but Losi's unbelievably clear diagrams and thorough text make construction easy. The notes and racer tips are especially helpful.

- When attaching the front shock tower to the bulkhead, take care not to overtighten the 4-40 capscrews that secure the tower; doing so may cause the bulkhead to strip. Tighten the screws until you begin to feel resistance, then carefully "snug" them up—don't overdo it or you'll be buying a new bulkhead!

- The hinge pin that secures the front steering spindle to the spindle carrier (figure 4 in the manual) fits very tightly. Make sure that the hole in the aluminum axle is aligned with that of the spindle before you insert the hinge pin. Then, use a small hammer or a plastic tool handle to lightly tap the pin into place.

- The newer-style turnbuckle linkage is a pain to use. I found that the small hex portions strip way too easily when the supplied wrench is used. I just tossed the stock turnbuckles and replaced them with a set of Lunsford Punisher titanium rods. I've heard that Losi is updating its turnbuckles to remedy this.

- When you install the 4-40 screws into the chassis, use soap or some type of lubricant that won't harm plastic on the screw's threads. This will enable you to thread the screws into the Stiffzel plastic much more easily and will prevent them from breaking off.

- Use light sandpaper or an emery board to remove any flashing from the molded parts—especially where they might contact another part.

- Disassemble the prebuilt shock-seal cartridges by using a hobby knife blade to carefully pry the plastic cap from the cartridge body. Remove the two O-rings and the spacer, and coat them with a liberal amount of RCPS\* Green Slime shock seal grease. Re-install the seals and the cap.

## SETUP

### FRONT SUSPENSION

Toe-in/out	1 degree of toe-in
Camber	3 degrees negative
Ride height	Slightly below "arms level"
Bellcrank position	Outside hole, two washers under ball
Outer camber-link ball	One washer under ball
Inner camber-link position	Inside hole
Upper shock position	Hole 2
Lower shock position	Middle hole in arm
Shock pistons	5-5-6"
Oil	35WT
Springs	Pink
Travel limiters	None

### REAR SUSPENSION

Pivot support	2 degrees anti-squat
Ride height	Slightly below "arms level"
Camber	1 degree negative
Shock tower position	Lowest
Upper shock position	Hole 3
Lower shock position	Inside
Outer camber link position	Hole A
Inner camber link position	Hole 5
Shock pistons	5-5-6"
Oil	35WT
Springs	Yellow
Travel limiters	1 "B" spacer outside

### CHASSIS

Length	XL chassis
Battery placement	7-cell, all the way back

*\*\* See "Performance" sidebar for details.*

## Things You'll Need

- 2-channel radio system.
- Relatively high-speed/high-torque steering servo.
- Battery pack.
- Battery charger.
- ESC.
- Motor.

■ XXT kingpin/ball—A-9708

■ CR graphite/composite rear arms—A-9810

■ Graphite/composite X-long chassis with braces—A-9904

■ Graphite/composite battery hold down, XL—A-9909

■ Axle bearing spacer and thrust washer set—A-9941



## Factory Options

■ CR rear pivot block, zero degrees—part no.

A-2112

■ Teflon™ shock pistons #57 (black)—A-5045

■ 2.75-inch spring, 1.6 rate (gray)—A-5146

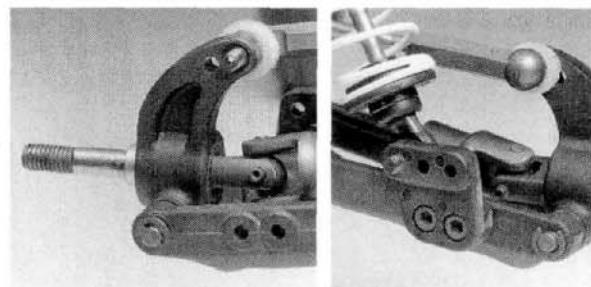
■ 2.75-inch spring, 1.8 rate (white)—A-5147

the brakes, the truck will actually make the turn, as opposed to sliding past it.

If you compare the older Losi rear suspension to that of the CR, you'll notice a few, more subtle changes. First, the inside pivot points for the rear arms have been widened to increase the arm mount's strength. Because the toe-in now occurs at the inside pivot, new, zero-degree rear hubs were made. These hubs offer only two positions in which to mount the rear camber rod (the old hubs offered five positions); however, according to Losi, the new hub's holes are the two most frequently used by racers. For comparison, hole A in

the new hub is equivalent to hole 3 on the old, and hole B is the same as the old hole 4.

To accommodate the new toe-in placement and wider mount, the CR's rear arms have been made slightly shorter than those of the old truck. Additionally, the new arms place the bottoms of the rear shocks further out on the arm—which increases the shock's "pack"—to give the truck better stability from side to side and allow the use of lighter oil and softer springs.



**Left: zero-degree rear hubs offer a simplified selection of camber-rod mounting holes. Right: new rear-suspension geometry places the shock's outer mounting position farther outward.**

• More rear suspension travel. An additional set of holes in the CR's rear shock tower allows it to be mounted lower on

## PERFORMANCE

**T**he outdoor, off-road track at R/C Madness in Enfield, CT, proved to be the perfect venue for the XXT CR test; its layout is challenging, there are lots of fast truck racers to compete against, and for the sake of comparison, I had tested the XXT's chief rival, the Associated® RC10T2, on this track just over one year ago (September '95 issue).

During the several "shakedown" runs prior to qualifying, the CR exhibited all the traits you associate with a Losi truck: its suspension soaked up all the bumps with relative ease, and it was stable as a rock (thanks in no small part to Losi's Hydra Drive system). What surprised me, however, was how well the new truck steers. All my racing buddies who own Double-XTs have told me that their trucks often push a little through certain types of turns. The CR corners as tightly as any truck I've ever driven, and in fact, I know a few buggy owners who *wish* their cars had this much turn-in!

The CR's new rear suspension design, combined with its elongated chassis, does the seemingly impossible—give more steering and allow the rear end to hook up even better. As a result, you can pretty much drive the CR on most tracks without having to brake for the turns; just let off the throttle and turn the wheel, and the truck will take virtually any line you choose.

After the first practice run, a friend noticed that the CR's back end was slapping through one of the mogul sections. Back in the pits, I felt the rear suspension and confirmed his observation. During assembly, I had installed Losi's molded no. 55 pistons in the rear shocks instead of the "drilled 55s" specified in Losi's setup sheet. I figured "a 55's a 55, right?" Well, not really; the holes in the molded 55 pistons are slightly larger than those made by drilling smaller-holed pistons with a no. 55 bit. To increase rear damping (without changing pistons), I changed the shock oil from 35WT to 40WT.

In the first qualifying heat, I learned two very important things: stay away from the chain-link fence that borders the track's main straight, and the CR is one durable stud-ride. Accelerating down the 150-foot-long straight, the truck wandered a bit too far to the outside and BAM! The left front side of the suspension caught the steel pipe of the fence's gate (thank God for dual airbags!). I thought for sure that the CR was broken. In fact, I was ready to leave the driver's stand until a marshal gave me the thumbs up and put the CR back on the track; it was unscathed.

I finished second in that round and then was able to better my time in the second round to qualify fifth in the A-Main. At the start of the main, I drove around two pileups and into second position. Soon after, the lead truck caught a board, and the CR slid by for the lead. I took advantage of the truck's excellent rough track stability and built a straightaway lead over the second place truck of Craig Chin, a very fast

local racer who is sponsored by Team Losi. Craig's truck was the pre-production version of the CR; it had everything that mine did except the elongated chassis.

Just as I was mentally "writing" about how I'd won with the CR in its very first outing, I made two mistakes that allowed Craig to move within striking distance. We hit the long straight—Craig's truck just behind mine—and the announcer said, "Let's see who has the horsepower!" Craig answered by pulling alongside for the pass, but an unexpected rut threw his truck onto its roof, and the CR cruised in for the win.

Scorecard: first race; new truck; a big win!

The following weekend, I brought the CR back to Enfield to attempt a repeat performance. I had changed rear shock pistons from the molded no. 55s to a pair of "5-5-6" pistons, i.e., a no. 56 piston in which two of the three holes have been drilled out using a no. 55 bit. With these pistons, I used 35WT shock oil. To better cope with a bumpy track, I added more negative camber to the truck's front wheels (for 3 degrees on each side). Doing this seems to improve the truck's steering through bumpy turns and lessens the likelihood of catching a rut and flipping. I also switched from 6-cell to 7-cell packs. No way was I going to be out-horse-powered!

Although the track was bumpier than it had been the previous Sunday, the CR felt just as dialed, even with the additional thrust of 7 cells. The kit-supplied tires—Losi's Silver-compound IFMAR pin rears and Directional fronts—hooked up as well as they had when new.

With today's motor technology, I rarely run any vehicle with 7 cells, but the CR handled the extra weight and punch like a champ. In fact, owing to my experience with this truck, I would now recommend 7 cells to any experienced truck racer. That 1 extra cell makes a big difference in acceleration, especially on short straights where the CR would gain as much as 5 feet on a truck equipped with only 6 cells.

During the first qualifier, I ran the CR into the fence again! This time, the impact was so great that the entire roof of the Lexan body was smashed in—as if the truck had been partially run through a car-crusher. But still, the CR remained undamaged, and I was able to pop the body back into shape (and free the occupants) using the "Jaws of Life."

Scorecard: fence vs. CR—stalemate.

On this Sunday, I placed the CR into the third-qualifying spot in the A-Main and ended up finishing in second place overall. With two races under its belt, the CR had pulled off a first- and a second-place finish. Not bad for a brand-new truck. In fact, the CR feels like an old friend after the first battery pack; it goes where you point it and doesn't surprise you. This is a truck without any bad habits, and mine will see a lot of racing action this season.

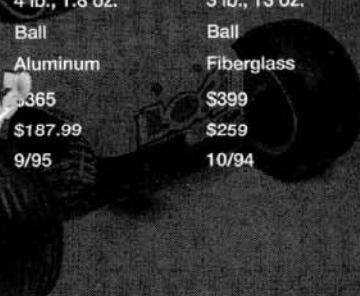
## THE COMPETITION

Team Losi Double-XT CR	
Wheelbase	11.4 in.
Width (F/R)	12.5/12.6 in.
Weight	4 lb., 3.1 oz.**
Diff type	Ball
Chassis	Stiffezell
List price	\$359.95
Available at*	\$209.99
Issue reviewed	12/96

\*Prices vary with location

\*\*Weight with 7 cells.

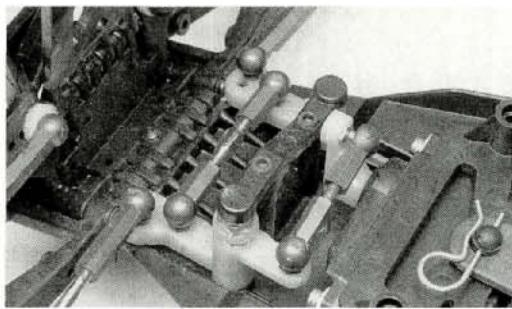
Associated RC10T2	
11.125 in.	11.3 in.
12.375/12.5 in.	12.25 in.
4 lb., 1.8 oz.	3 lb., 13 oz.
Ball	Ball
Aluminum	Fiberglass
\$365	\$399
\$187.99	\$259
9/95	10/94



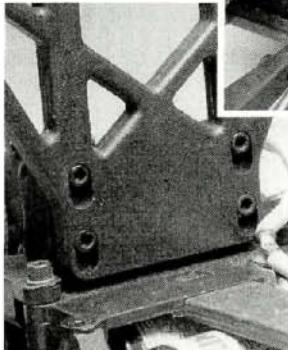
## DOUBLE-XT 'CR'

the rear bulkhead. Because the tower is lower, the rear suspension has more travel for better handling on bumpy tracks. According to Losi, even when you run on smooth tracks where less travel is needed, you should still attach the tower in the lower position. To limit travel, install spacers in the shocks.

• **Aggressive steering.** The CR also includes a new steer-

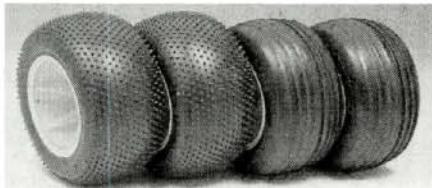


**Above:** redesigned steering bellcranks provide an additional set of holes for the steering tie rods. **Left:** an additional set of mounting holes allows the shock tower to be attached in a lower position for more suspension travel. **Below:** front suspension arms now can accommodate an optional front swaybar.

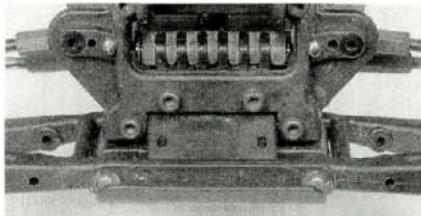


steering angles between the left and right tires when the truck negotiates a turn) to provide more or less aggressive steering. Generally, using the innermost holes in the bellcranks gives more steering.

• **Other changes.** These include revised front suspension arms (that will accept Losi's optional front swaybar) and a new, low-profile racing



**Losi's excellent IFMAR pin rear tires and Directional fronts (in Silver compound) come as standard equipment.**



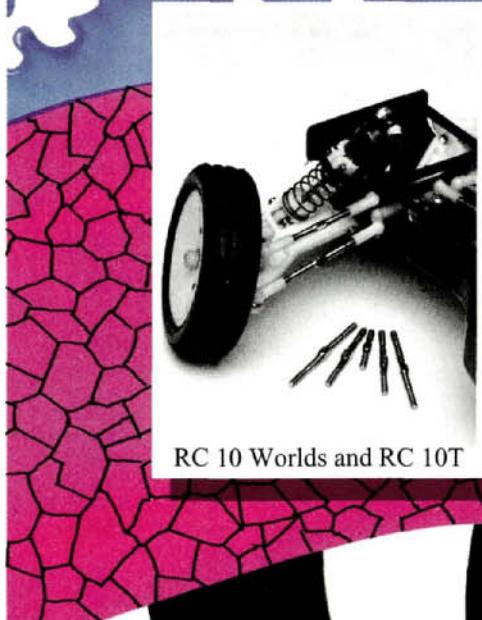
ing bellcrank system that provides an additional hole in which to attach the steering linkage. Changing holes alters the truck's Ackerman (the difference in

truck body that fits the elongated chassis. In addition, the CR comes with Losi's excellent IFMAR Pin rear tires and Directional fronts, both of which are molded of super-sticky Silver compound rubber.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

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# England's **Top Tourer?**



## SCHUMACHER **S.S.T.**

WHEN I FIRST LOOKED at Schumacher's\* S.S.T. 2000 touring car, I quickly noticed the similarities between it and another popular touring car, the Yokomo\* YR-4. At a glance, you'll see that they have similar drive trains, chassis designs, suspension systems, etc. But on further inspection, I realized that although the S.S.T. 2000 might share some features with its chief

competitor, it has actually gone a step further than the YR-4 in a few areas. How so? Let's take a closer look.

### FEATURES

- **Chassis.** The S.S.T. 2000 is based on a thick black fiberglass chassis with a black fiberglass upper stiffener. The lower chassis plate is surprisingly thick, but thanks to its almost overkill degree of thickness,

by John Howell

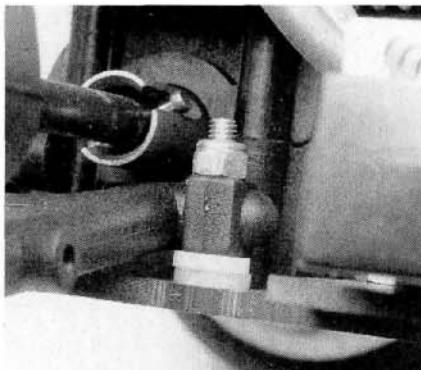
it ultimately provides a flex-free ride. The battery runs laterally across the chassis, and this is the case with most of the other touring cars on the market. Two optional graphite chassis are available from Schumacher; one is standard, and the other offers a saddle-pack configuration. A standard fiberglass saddle-pack chassis is also offered in Schumacher's line of hop-ups.

• **Drive train.** Ball diffs reside in front and rear exposed housings like those of the Yokomo YR-4. Both diffs are turned by a belt-drive system that incorporates two belts working off one center shaft. Plastic drive shafts help transfer the power to the ground. The entire assembly rides on ball bearings.

The kit I received was built by Schumacher, and it had some fairly gritty-feeling diffs. I plan to tear them down and rebuild them, and this should remedy the problem.

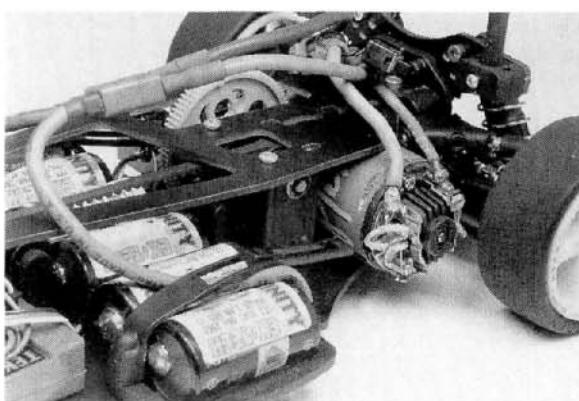
• **Suspension.** Schumacher's suspension arms are among the best I have ever seen on a touring car. They're rigid, and they also have a grub setscrew incorporated in their design. This allows you to fine-tune suspension-arm sag when you alter front caster and rear anti-squat settings (for more on adjustable anti-squat, keep reading).

As built, the car has 7.5 degrees of caster. One nylon washer is placed on each side of each upper control arm (at the bulkhead). To reduce caster, you remove the



**Underneath the front of the rear bulkhead, you'll find two nylon washers that raise the rear arm mount to adjust the rear anti-squat. When the washer is raised or lowered, the car's rear anti-squat is changed. The car comes with 2.5 degrees of anti-squat.**

testing, and I have no complaints about their performance, but I was surprised to find them in what is considered to be a pro-level kit. Most other high-end touring cars come with hard-anodized aluminum shocks. Why are they absent from this one? To be fair though, I have to say that the S.S.T. 2000 is the least expensive 4WD race-oriented touring car on the market right now.



**For horsepower, I used a Trinity 13-turn triple Dirtinator modified motor and Trinity's new GM-VIS cells. "Silly fast" were the key words of the day.**

washer from the front of the arm and place it toward the rear against the other washer. Less caster gives the car quicker steering response but could reduce on-power steering. By moving both washers to the front of the arm, you increase caster. More caster gives the car slightly slower turn-in but more on-power steering.

Another impressive feature is the car's rear uprights. The rear uprights are not fixed or locked in place as on most other touring cars. They're mounted on the rear suspension arms by a single screw that goes through pivot balls that are attached to the end of the arms; their tops are held in place by the upper arm/camber links. Thanks to this design, front as well as rear toe is completely adjustable.

The only aspect of the suspension that didn't thrill me was that the car includes plastic shocks. They worked fine during

• **Adjustable rear toe-in.** As I touched on earlier, not only is the front toe adjustable, but the rear is as well. This is especially beneficial when you try to dial in your car to different track surfaces. The car came from the factory with 3 degrees of toe-in on each side, which the factory recommends as a good standard setting (more than 3 degrees is not recommended). To get more steering response, you slightly reduce rear toe-in.

• **Adjustable rear anti-squat.** One of the more interesting features of the S.S.T. 2000 is its adjustable rear anti-squat (two nylon washers raise the front of the rear bulkhead). The car came with 2.5 degrees of anti-squat, which helps it get more traction on slippery surfaces. The negative effect of having too much anti-squat is that although the car has more forward traction, it also tends to get a bit

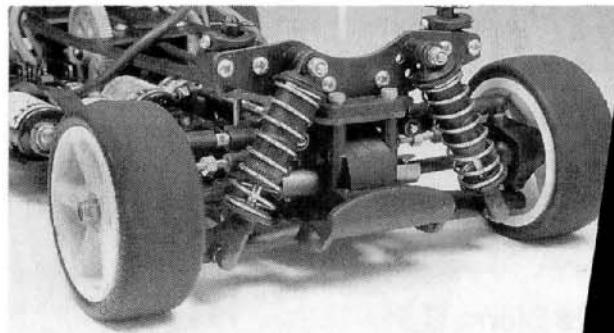
unstable when it turns into high-speed corners. Grub setscrews on both rear suspension arms allow you to adjust suspension-arm sag (referred to as "suspension droop" in the manual) when you alter the anti-squat.

• **Electronic layout.** Everything fits well on the S.S.T. 2000. A fiberglass ESC mounting tray is mounted in front of the right rear wheel, next to the spur gear (this is beneficial because it helps to keep the motor wires and the battery leads short). Both the receiver and the steering servo are mounted up front on the bottom plate.

• **Body, wheels and tires.** There are two pluses and one minus in this category. From a purely aesthetic point of view, I do

## SPECIFICATIONS

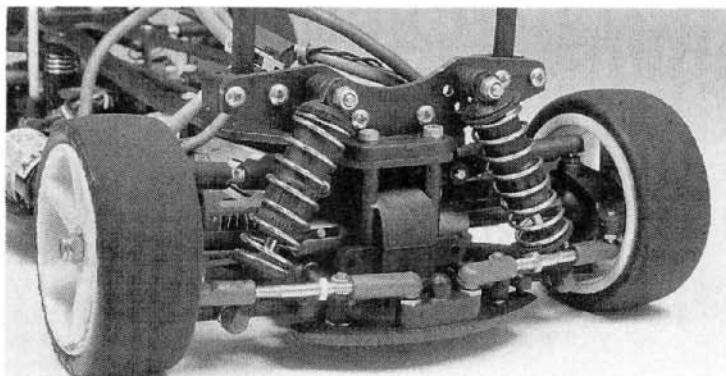
SCALE	1/10
LIST PRICE	\$319.50
<b>DIMENSIONS</b>	
Length overall	12.56 in.
Wheelbase	10 in.
Width (F/R)	7.125 in.
<b>WEIGHT (gross, RTR)</b>	
	3 lb., 7.3 oz.
<b>CHASSIS</b>	
Type	Double-deck
Material	Fiberglass
<b>DRIVE TRAIN</b>	
Type	Belt-driven 4WD
Primary	Pinion/spur
Differential(s)	Ball differentials
Bearings/bushings	Bearings
<b>SUSPENSION (F/R)</b>	
Type	4W independent with adjustable upper link
Damping	Oil-filled, coil-over shocks
<b>WHEELS (F/R)</b>	
Type	One-piece plastic
Dimensions (DxW)	2x1 in.
<b>TIRES (F/R)</b>	
	Slicks
<b>ELECTRICS</b>	
Motor, battery, ESC	Not included



**The front end is equipped with plastic shocks, a small bumper, and a fiberglass shock tower with four shock-positioning holes.**

not particularly care for the included BMW body. It curves and flares a little too much for my taste. After my buddy the G-Man (aka George Gonzalez) had painted it with Pactra\* and Coverite\* paints, it started to look slightly more appealing.

On the plus side, the included tires and wheels are very, very awesome! The five-spoke wheels are slick-looking and are also pretty stiff. And the included low-profile slick tires are equally awesome. When mounted, they look as if a thin rubber strip has been painted on the wheels themselves; the tire's sidewall is not tall at all. This prevents the tire from rolling over on itself during hard cornering, so the car remains planted through the turns. The tires are very sticky, and they hooked up well on the track where I tested the car.



**In back, you'll find plastic shocks, the same style of fiberglass shock tower and two turnbuckles to adjust rear toe.**

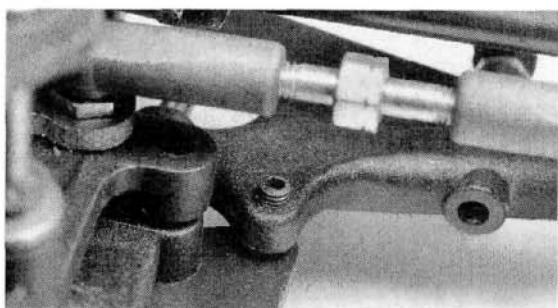
#### TEST GEAR

- Trinity\* GM-VIS 30A cells
- Trinity Dirlinator 13-turn triple
- Tekin\* G-12c ESC
- Tekin 3-channel FM receiver
- Airtronics\* Caliber 3Ps
- Airtronics 94157 servo
- Deans\* Ultra plugs

#### PERFORMANCE

As I mentioned, I received the Schumacher S.S.T. 2000 completely built. I ran it "as is" to see how it would perform as set up by the factory (I've been told that it's now also available in kit form).

I re-peaked my Trinity GM-VIS cells on my Tekin BC112C, grabbed the car and my radio and headed out to a parking lot across the street from our office. The lot is freshly



**When you alter anti-squat and front caster, these grub setscrews help you adjust suspension droop.**

#### THINGS YOU'LL NEED

- 2-channel radio system.
- Relatively high-speed steering servo.
- Battery pack.
- Battery charger.
- Lexan paint for body.
- ESC.
- Motor.

- Ball bearing set—part no. U1851
- 35mm titanium turnbuckle (pair)—L035
- 39mm titanium turnbuckle (pair)—L039
- 25mm titanium pivot pin (pair)—L110
- 29mm titanium pivot pin (pair)—L120
- 42mm titanium rear lower pivot—L142



#### Factory Options

- 53mm titanium front lower pivot—L153
- Titanium full set—L200
- Ball bearing (steering)—U1248
- Diff center ball bearing (4x8)—U1419
- Tungsten-carbide diff balls 4mm (pack of 10)—U1475
- Tungsten-carbide balls 1/16-inch (pack of 8)—U1476
- Motor screw set (long)—U1496
- Slipper layshaft (standard)—U1497
- One-way pulley set—U1498
- Front belt tensioner—U1512
- Purple alloy rear tranny housing—U1563
- Purple alloy front tranny housing—U1745
- Viscous drive unit (requires layshaft)—U1787
- Viscous layshaft—U1788
- Purple alloy shock seal housing (pair)—U1818
- Ball bearing set (Viscous Drive)—U1825
- Purple alloy upper trans housing—U1867
- Lower chassis WFE saddle—U1898
- Upper chassis WFE saddle—U1899
- Lower chassis carbon-fiber stick—U1900
- Upper chassis carbon-fiber stick—U1901

paved and exceptionally smooth. On occasion, I've found it slightly dusty; other times, it has been as smooth as glass. On that day, conditions were mixed. Certain sections were dusty; others were totally clean and appeared to be properly prepped for full-speed running—a surface similar to those most parking-lot pilots drive on.

I set my torque limiter on my Tekin to 40 amps, placed the car on the asphalt, stood back and nailed the throttle. The

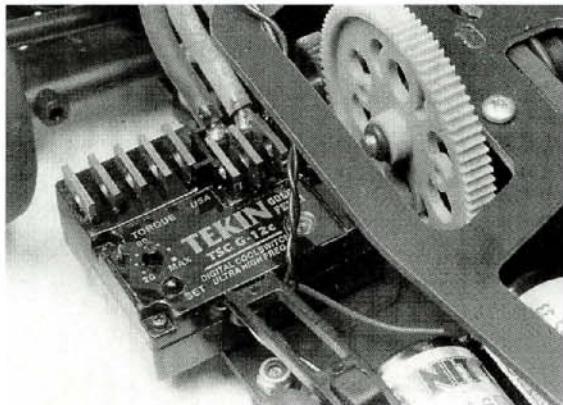
resulting slow crawl did absolutely nothing for me, so I turned the car around, brought it back into the "pits" and fiddled a bit with the torque limiter. I set it at 80 amps, and when I nailed the throttle, the car launched off the line with authority. The car is up to the task of handling a lot of horsepower. Forward acceleration was excellent, and it showed no signs of weaving from side to side when under power. The 2.5 degrees of anti-squat surely plays a large part in the car's admirable on-power performance. I noticed that it got a little loose going into hard turns while I gave it a decent amount of throttle. As I put the car through its paces, I found it to be otherwise smooth. At speed, I was easily able to manage some wild-looking four-wheel drifts, but when I backed off the throttle, the car became quite manageable and hooked up again quickly.

For comparison's sake, I brought out

- Lower chassis carbon-fiber saddle—U1902
- Upper chassis carbon-fiber saddle—U1903
- Shock tower carbon fiber (each)—U1904
- Motor heat-sink set—U1909
- Alloy one-way pulley set (requires shaft)—U1910
- Layshaft one way plus Viscous Drive—U1911
- Layshaft one way plus slipper clutch—U1912
- Layshaft one way plus non slipper—U1913
- Steel drive shafts "Blades" (pair)—U1917
- Anti-roll-bar set (pair)—U1919
- Lexan belt guard—U1920

one of my highly modified touring cars, and I let Frank Masi drive it while I drove the S.S.T. 2000. Surprisingly, the S.S.T. was able to keep up. Frank is no slouch behind the wheel, so I know it wasn't his driving that allowed me to keep up. This car is potent out of the box. I can now see why so many racers have been raving about it.

I plan to reduce anti-squat and work with the car's front and rear camber. That should improve the car's overall performance. The gearing may have been a little off as well. I ran the included 86-tooth spur gear and a 25-tooth Robinson Racing\* spur gear, and this gave me an overall ratio of 6.88. Next time



I mounted my Tekin G-12c on the included fiberglass mounting tray. It's close to the motor, so I was able to keep my wiring job relatively short and simple.

car that might have a distinct advantage over the S.S.T. 2000, and it's the YR-4M (and I stress the "it might" part). But, the S.S.T. is much, much cheaper than the YR-4M—\$130 to be exact! I'm sure that if I reinvested \$130 in Schumacher's hop-ups for the S.S.T. 2000 and I decked it out so that it more closely resembled the "M" (a graphite saddle-pack chassis and aluminum, hard-anodized shocks), it would rival or possibly even surpass the "M" in performance.

Out of the box, though, it's an admirable performer, and right now, the S.S.T. 2000 is the least expensive racing-oriented touring car on the market. From a tuner's standpoint, it is also one of the most versatile cars. In my book, that's a combo that can't be beat. So if you want to jump on board the touring-car craze and you're not sure which one is for you, I'd take a real long, hard look at this car. It's one of the best in its field. Next month, we'll have all the top tourers lined up head to head to do battle to decide which one reigns supreme. Don't be surprised if you see this car at or near the very top of the heap.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.

### LIKES

- Highly tunable.
- Includes some tuning aids not found on other cars (adjustable anti-squat, front caster and rear toe).
- The car works well out of the box.

### DISLIKES

- A belt tensioner is not included.
- Replacement and hop-up parts are more difficult to find than those of other touring cars.

around, I plan to drop a tooth on the pinion to give me a ratio of 7.17 instead. Finally, I would change the rear damping to make the rear of the car a touch stiffer. After running it for a while, I noticed that I had scratched the bottom of the chassis toward the rear. The front seemed fine.

### FINAL THOUGHTS

Honestly, I've messed with only one other

## THE COMPETITION

### Kyosho TF-2

Wheelbase	10.3 in.
Width (F/R)	8 in./8 in.
Weight	3 lb., 4 oz.
Diff type	Gear
Chassis	Graphite/alum.
List price	\$259.99
Available at*	\$199
Issue reviewed	8/95

### Yokomo YR-4

Width (F/R)	10.25 in.
Weight	3 lb., 3 oz.
Diff type	Gear
Chassis	Fiberglass
List price	\$269
Available at*	\$209.95
Issue reviewed	8/94

### Tamiya TA03F-Pro

Width (F/R)	10.1 in.
Weight	3 lb., 8.7 oz.
Diff type	Gear
Chassis	Fiberglass
List price	\$356
Available at*	\$204.99
Issue reviewed	10/96

### HPI RS4

Width (F/R)	10 in.
Weight	3 lb., 5 oz.
Diff type	Gear
Chassis	FRP**
List price	\$298
Available at*	\$199.99
Issue reviewed	5/96

### Yokomo YR-4M

Width (F/R)	10.32 in.
Weight	6.5 in./6.25 in.
Diff type	Gear
Chassis	Black fiberglass
List price	\$425
Available at*	\$319.95
Issue reviewed	9/96

### Tenth Technology Predator DTM

Width (F/R)	10 in.
Weight	7 in./7.25 in.
Diff type	Gear
Chassis	Resin composite
List price	\$479
Available at*	\$320
Issue reviewed	7/96

### Schumacher S.S.T. 2000

Width (F/R)	10 in.
Weight	7.125 in./7.125 in.
Diff type	Ball
Chassis	Fiberglass
List price	\$319.50
Available at*	\$190
Issue reviewed	12/96

\*Prices may vary with location.

\*\*FRP = fiberglass-reinforced plastic

## Building & Setup Tips

Because the S.S.T. 2000 was sent to me built, I don't have many building tips to pass along. I did notice, though, that the front and rear differentials were not as smooth as I would have liked (actually, they were pretty notchy). As I said in the main part of this feature, I plan to rebuild them soon.

As for setup tips, I contacted Schumacher USA in Florida to get the hot setup. Here's what I learned from them. Apparently, the car is pretty dialed with these settings.

### Front End

Shock tower	Top hole (no. 1)
Shock oil	30WT
Toe-in	zero
Camber	zero
Holes open in shock piston	1
Shock spring	Grey

### Rear End

Shock tower	Hole closest to the inside of tower (no. 2)
Shock oil	35WT
Toe-in	+2 degrees
Camber	-1 degree
Holes open in shock piston	1
Shock spring	Blue
Anti-squat	1.6mm (one thin nylon washer)

### Gearing

Pinion	25T
Spur	.86T (standard)

### Tires

Front	Yellow slicks (standard) with hard foam
Rear	Yellow slicks (standard) with medium foam

### Miscellaneous

Plastic drive shafts, front swaybar	
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# SERPENT Impact 2

by DOUG MERTES

I'VE BEEN IMMERSED up to my ears in the world of R/C cars and trucks for almost 10 years, but in all that time, I've worked exclusively with electric-powered vehicles. On-road, off-road, trucks, buggies, F1, sedan, mini,  $\frac{1}{10}$ -scale,  $\frac{1}{12}$ -scale, carpet, asphalt; you name it, I've raced it. I had never even stroked the throttle of a gas-powered vehicle, though, until I received a call from the *R/C Car Action* office asking whether I'd be willing to take on a very special project—Serpent's\* Impact 2. They rated it a "12" on a "wow" scale of 1 to 10; fair warning, I thought, for what was sure to be a complex and unusual assignment. But why a 12 instead of a 10? Their response: "Man, this car is sillyfast. We're talking 60mph plus! It comes with the Mega SX-15 engine, and it's probably the fastest legal  $\frac{1}{10}$ -scale 2WD gas car you can buy. It has so much power it will make you giggle."

What they didn't know, however, was that I spent more than 20 years involved with hot-rods and fast, 2-stroke on-road motorcycles before I ever touched a pistol-grip radio. I knew my way around an expansion chamber and a narrow powerband, as well as how to set up, tune and

repair small, high-performance internal-combustion engines. Because of my existing knowledge of R/C chassis' setup and my experience with small-bore screamers, I would be able to deal with anything the guys at *R/C Car Action* could throw at me. On balance, things worked out how I thought they would. I just wish I hadn't waited so long to try a gas-powered car!

#### KIT FEATURES

The Impact arrived in the nicest packaging I've ever seen (it looks as if it came from Bloomingdales). Everything is neatly bagged—according to the major assembly steps—and enclosed in two, narrow, boxed channels that flank the partially assembled front and rear bulkheads, which are mounted on the gorgeous aluminum chassis and purple-anodized aluminum radio plate.



**Serpent's Mega-SX .15 engine puts out gobs of horsepower, holds its settings and fires to life on the first flywheel bump almost every time. It's got a real purty purple head, too.**

My first view of the packaging set the tone for the rest of my experience with the Impact, as well as with the entire Serpent organization. Everything is first-class, from the high-quality of the molded parts, to the precision of the machining, to the detail and depth of their website ([www.serpent.nl](http://www.serpent.nl)). I knew that the *R/C Car Action* staff had looked in the box before they shipped everything to my secret underground laboratory; the broken package seals and the drool marks on the box and bags were dead giveaways. They had also included some upgrade parts, spare tires and wheels and a Serpent Powerstart starter box. If nothing else, I would be well-equipped.

Serpent includes two manuals with each Impact car. The first is an assembly manual full of line drawings, exploded-view diagrams, photographs and full-scale drawings of each small part used in every step of the construction process. The second is a setup manual, and it includes suggested suspension settings for various track conditions, troubleshooting for specific suspension and performance problems



# Dutch

and a couple of blank setup sheets. This allows you to keep track of the changes made and the differences in the car's performance that result. Unfortunately, there is little or no written text in the assembly manual; during assembly, I found this troublesome from time to time. After I had finished the car, I spoke with Ed Enberg of Serpent USA, and he admitted that a text inclusion would be a worthwhile addition to the kit. Don't let the lack of text discourage you from buying this fabulous car, because Serpent's tech people are easy to reach by phone or email.

The assembly starts with the front and rear suspension arms, disk brake, rear ball differential and rear swaybar. I found it interesting that much of the car is held together by long, self-tapping Phillips screws, and the

**The Serpent Impact 2** is a scaled-down version of its older 1/8-scale sibling, the **Excel**. This car is capable of reaching speeds of 60 mph! The version tested here is in 2WD configuration; a 4WD racer is also available.



PHOTOS BY WALTER SUDAS



## SPECIFICATIONS

SCALE ..... 1/10  
LIST PRICE ..... \$995

### DIMENSIONS

Length overall ..... 16 in.  
Wheelbase ..... 10.75 in.  
Width (F/R) ..... 8.75/9 in.

### WEIGHT

(gross RTR w/sedan body and half tank of fuel) ..... 3 lb., 13 oz.

### CHASSIS

Type ..... Double-deck  
Material ..... Aluminum (lower)  
Anodized-aluminum (upper)

### DRIVE TRAIN

Type ..... Belt drive  
Primary ..... 2-speed, pinion/spur  
Clutch ..... Centax Pro centrifugal  
Transmission ..... Belt/pulley reduction  
Differential ..... Ball  
Bearings/bushings ..... Bearings

### SUSPENSION (F/R)

Type ..... Articulated upper and lower A-arm  
Damping ..... Oil-filled shock absorbers

### WHEELS (F/R)

Type ..... Nylon  
Dimensions (DxW) ..... 2x1.5/2x2

TIRES (F/R) ..... Special Ellegi foam, numerically rated

## SERPENT IMPACT 2

hinge pins are all held in place by self-tapping grub screws. Because the Impact is in many ways a downsized version of Serpent's popular Excel 1/8-scale racer, I guess that this makes sense. These cars travel very, very fast, and they need to be able to hold up to the forces that result from starting, stopping and cornering at high speeds. From the thick-aluminum chassis to the beefy steering spindles and suspension arms, everything on the car is much heavier than on its electric brethren.

Once the arms have been mounted, the front and rear hub carriers are attached by means of some very substantial threaded ball ends that allow you to adjust toe-in/out and camber in tiny increments with absolute precision. The rear differential design allows you to adjust the diff

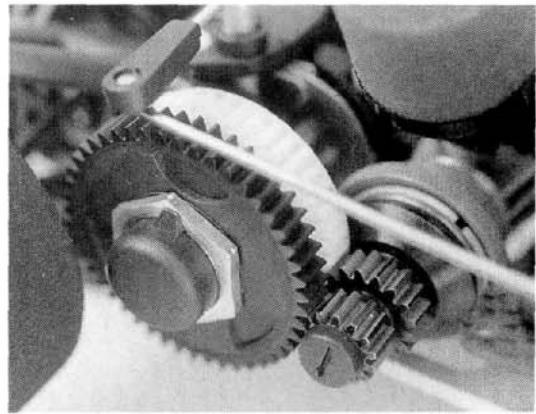
without disassembling it—a very valuable feature!

Next, the 2-speed transmission goes together. This little gem allows you to adjust the shift points and speed of the shift via several spring-loaded socket screws accessed through the hub carrier's outer rim. Neat!

The front and rear wheels are mounted on the steering axle and drive axle with hollow shafts that have a drive pin on one end and a spring-loaded lever that extends from inside the shaft; it's features like this that I especially liked. Move the lever out of the way, push the wheel onto the shaft, and the drive pin engages the inside of the wheel and the lever pops back down to hold the wheel in place. This is so cool that I'm trying to figure out a way to get my machinist friend to make a set for some of my electric cars.

The shock absorbers are beefy aluminum units with purple-anodized caps and threaded bodies with preloaded adjuster rings. They can be built as conventional shocks with fixed pistons, or with two-piece pistons that allow you to change the size of the piston holes with a twist of the shock shaft. This looks like a neat idea, but to start out with, I built mine with one-piece, three-hole pistons. At a later date (when I know how the car should handle), I'll try the complex-on-tronic ones.

The next step was to install the radio gear on the upper deck. Although the car



**An included 2-speed transmission helps the Impact 2 reach blazing speeds. It is fully adjustable and you can adjust shift points as well as the speed of the shifts by turning spring-loaded socket screws located in the hub carrier's outer rim.**

comes with an anodized-aluminum radio plate, I decided to use the lighter, optional graphite one instead. I mounted a pair of Futaba\* 9304 servos (fast and strong), a JR\* PCM-FM receiver for solid locked-on radio reception and a DuraTrax\* 5-cell receiver pack. Serpent's supplied receiver and battery mounts fit these parts perfectly, but I had to look around for a couple of those little bags of parts that come with servos so that I'd mount the servos on the proper rubber grommets.

I used the included servo-saver, and the steering linkage fit like a glove. The kit's fuel-tank kit plopped down into its little home without a whimper. The installation of the body mounts (the kit comes with mounts for both GTP and Sedan bodies), shocks, bumper, roll bar and other minor parts brought the car close to completion.

### LIKES

- Fast, fast, fast!
- Lots of run time on one tank of gas.
- Fast, fast, fast!
- High-quality parts.
- Fast, fast, fast!
- Handles and tunes as if it's full-scale.
- Did I mention that this thing is fast?

### DISLIKES

- Manual needs text that explains adjustments and assembly.
- Carb linkage is difficult to set up properly.

## Building & Setup Tips

The springs that come with the shock absorbers are short and very stiff. I found them too stiff to give me good traction on an unprepared surface. I enlarged the piston holes in the rear shocks, replaced the shock fluid with Associated\* 40WT silicone and used Associated Gold front springs (the original Serpent fluid felt as though it was in the 80WT range, even though the bottle says 50WT). These springs were longer and required less preload than the kit parts. The softer shock action gave me the traction I needed, while the stock swaybar kept things on an even keel.

The differential came loose while I was putting the car around and breaking the engine in. To fix it, I had to disassemble the entire rear half of the car. I used some Shoe-Goo on the threads of the adjustment screw to make sure that it wouldn't back out again. I had "buzzed" the thrust bearing, so the diff now feels notchy and gritty. I'll replace the thrust bearing to get the smooth diff action back again, but learn from my mistake: lighter is better.

Take a moment to figure out whether the receiver you decide to use has to be mounted above or below the radio plate. I had to lift the plate and drop the bracket down from the top for everything to clear. I was surprised, because the JR PCM receiver I used isn't very tall. Your results may vary.

After you've run through a couple of tanks, tear down the suspension and make sure that the arms are not binding. The front and rear arms should drop under their own weight when the shocks and swaybar are removed. If the arms bind, you'll never get the car to handle right. Play with the hinge pins and arms until it's perfect; this is time well spent.

Check the head temperature regularly and adjust the needle if necessary to maintain the proper mixture. Using a small bottle of water with a squirt cap, I dripped a little water on the head (the thought of spitting on an expensive motor just didn't seem right). If it sizzles and disappears right away, you're running a little too hot. If it evaporates in about 3 seconds without sizzling, you're just right. Proper head temperature is one of the keys to long motor life.

Don't hesitate to play with camber and toe-in settings until you are comfortable with the way the car handles. Keep a record of the changes you make so that you can go back if you have to. An inexpensive camber gauge, like the one sold by RPM\*, will make it easier to set up both sides in the same way. For you bring-along-the-laptop types, Serpent also produces an excellent evaluation and administration software program called START.

Take your time when assembling the car; you may find some of the assembly steps a little frustrating without accompanying text. Assembly will be easier if you refer to some of the pictures in this article.

## SERPENT IMPACT 2

Finally, it was time to mount up the Mega SX-15 engine that was included with the kit (the Impact 2 is available with or without this engine, and in 2WD or 4WD configurations). Reputed to be a real buzz bomb, the engine bolted in without any problem at all, although I did take some extra care to make sure that the pinion spacing and the clearance between the spur and clutch bell were proper.

Serpent's Centax Pro unit was the clutch that came in my kit. Three small, ceramic weights reside inside the clutch bell and are driven into the clutch face by centrifugal force. The faster the engine spins and the more power it creates, the harder the clutch engages—pretty neat! Clutch engagement is adjustable through a small access port that is built into the clutch housing. Make sure that there's 8.2mm between the end of the shaft

### THINGS YOU'LL NEED

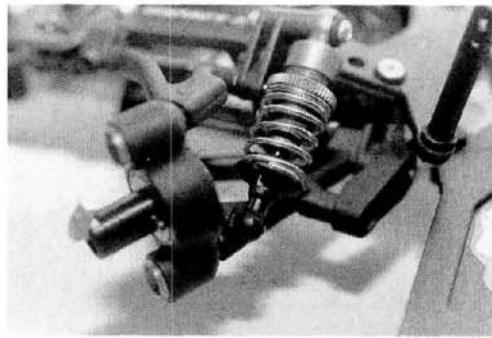
- 5-cell receiver pack (for radio and servo power).
- Glow fuel for cars. To meet EFRA rules, Serpent recommends a maximum of 16-percent-nitro, but I used 20-percent-nitro Blue Thunder on the advice of the local gas guys.
- Glow-plug Igniter (Du-Bro's Kwik-Start worked well for me).
- Fuel bottle (I used Dynamite's inexpensive Turbo Fueler).
- Transmitter and receiver (high-quality FM is better than AM; I prefer to use a PCM radio with a car this fast).
- Two servos (both need to be very strong, 70 oz.-in. or more).
- Screw-locking compound or Shoe-Goo (everything vibrates loose on a gas car).
- Air-filter oil (I used K&N's filter-care service kit).
- Starter box.



### Factory Options

- Aluminum quick-change levers (front/rear)—part no. 88323.
- Carbon-fiber radio plate—88106.
- Front wheel axles (4WD)—88215.
- Special .15 foam air filter—2546.
- 4WD conversion set—88270.
- Mega SX-15T 8-port turbo engine (faster, but not EFRA legal)—2602.
- Numerous body sets and decals.

**The hard-anodized aluminum shocks have threaded spring preload adjusters incorporated into their design. You have the option of building the shocks with traditional fixed-hole pistons, or with two-piece pistons that allow you to adjust the size of the piston holes with a turn of the shock shaft.**



### PERFORMANCE

I set up the Impact 2 with fairly neutral, forgiving suspension settings:

- about 2 degrees rear toe-in (for traction);
- no front toe;
- 1 degree of negative camber, front and rear;
- the stock kit tires;
- 50WT Serpent silicone shock fluid all around with three-hole pistons.

I say "almost" because I spent an entire evening figuring out a way to make the throttle linkage work properly. The way the parts came from the factory, the throttle linkage just wouldn't clear the gas tank at anything above partial throttle. I tried everything I could think of to make the original parts work, but I wound up looking through my boxes of spare parts for a way to increase the offset of the wire from the carb. I finally settled on a body-post ring made of machined Delrin. It required a little creative reaming to make it fit, but it provided me with the ideal linkage spacing. It's neat, it's bulletproof, and it works!

At last, it was time to mount the gorgeous Serpent-supplied Mercedes DTM body (done up in Sunoco IMSA colors with a "fly-away" rear-end paint scheme by Scot Bich of Bich'n Bodies\*). This is the third time I've worked on a project of this type with Scot, and he has come through with a beautiful product every time. Autographics\* was kind enough to supply the Sunoco logo decals. Serpent sells several different sedan bodies (Opel Calibra, BMW, etc.), as well as the Group C/GTP closed-cockpit racing bodies that are more typically seen in gas racing in the U.S. Because gas chassis use larger wheels and tires than their electric counterparts, the wheel wells and cutouts have to be larger. Bodies meant for electric cars just don't fit properly.



**From the underside of the car you can clearly see the light-weight aluminum chassis. The all-aluminum chassis helps dissipate heat from the included Mega-SX .15 engine.**

CAR ACTION  
**THRASH TEST**  
1/10 SCALE GAS



*sizzlin'*  
*stingray*

**SPECIFICATIONS**

**SCALE** ..... 1/10  
**LIST PRICE** ..... \$299.99

**DIMENSIONS**  
**Length overall** ..... 18.5 in.  
**Wheelbase** ..... 10.2 in.  
**Width (F/R)** ..... 7.8 in.

**WEIGHT** (gross, RTR) ..... 3 lb., 2 oz.

**CHASSIS**

**Type** ..... Dual-plane plate  
**Material** ..... Anodized aluminum

**DRIVE TRAIN**

**Type** ..... Belt-driven 4WD (8.11:1 ratio)  
**Primary** ..... Pinion/clutch bell/spur  
**Transmission** ..... Dogbone/axle  
**Differential(s)** ..... Beveled gear  
**Slipper clutch** ..... NA  
**Bearings/bushings** ..... Metal bushings

**SUSPENSION (F/R)**

**Type** ..... 4W independent A-arm w/upper link  
**Damping** ..... Friction/coil-spring

**WHEELS (F/R)** ..... 1-piece plastic spoke

**TIRES (F/R)** ..... Pneumatic rubber,  
on-road tread, foam inserts

**POWERPLANT**

**Engine** ..... Kyosho GS-11X (included)  
**Pipe** ..... Expansion chamber  
**Carb** ..... Barrel-type

# KYOSHO '67 Corvette

by Ken Marcum

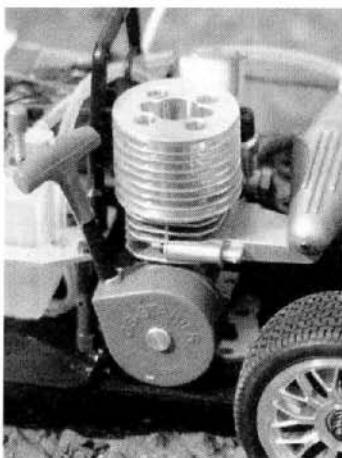
**M**AKE A LIST of your all-time favorite cars and what do you come up with? I don't think anyone's list would be complete without the Corvette—huge-horsepower engines in lightweight fiberglass shells. Within its Nostalgic Series of R/C cars, Kyosho\* has captured one of the finest examples of Chevrolet's muscle car—the 1967 Corvette Stingray.

The original had a 427ci V8, so it's only fitting that Kyosho's R/C version be nitro-powered. Kyosho pulled out their trusty GP-10 chassis as the basis for the 'Vette. A belt-driven 4WD, independent suspension and aluminum chassis and radio tray are all trademarks of this reliable design.

## KIT FEATURES

As with all Kyosho kits, the instructions are very clear and have great exploded-view drawings and full-size drawings of every screw, nut and washer called for in each of the steps. The kit went together very easily. The fit of the parts was precise and required no modifications.

Anyone who has built a Kyosho 4WD



***The kit-supplied GS-11X worked flawlessly. With just a couple of pulls, it started the first time out of the box. Once it had warmed up, it had quite a bit of power. The engine-mount plate accepts .12-size engines with an optional mount.***

Candy Red. I backed it with Pactra's Grand Prix Gold to give the finished project a deep, rich, candy-apple look. The

car will recognize many of the parts and assemblies. The front steering blocks, the carriers and the front and rear gear diffs are standard on many of the Kyosho 4WD cars such as the Lazer and Spider. I followed the instructions to the letter and had the rolling chassis built in less than four hours. After another four hours for the radio installation and body finish, I was ready to go.

## BIG-BLOCK BODY

The body on the Corvette is an excellent rendering of the classic Stingray. Detail touches such as chrome side pipes and bumpers are attached to the Lexan body with screws. Plastic washers prevent the screws from pulling through the body in the event of a collision.

Kyosho recommends that you paint the Stingray in either black or red, and they include the corresponding LT-1 stripes to match both colors. I wanted my 'Vette to have more of a hot-rod look to it, so I painted it with Pactra's\*

decal sheet also includes the front grill, door handles, license plate, turn signals and the signature crossed flags and Stingray emblems.

## TEST GEAR

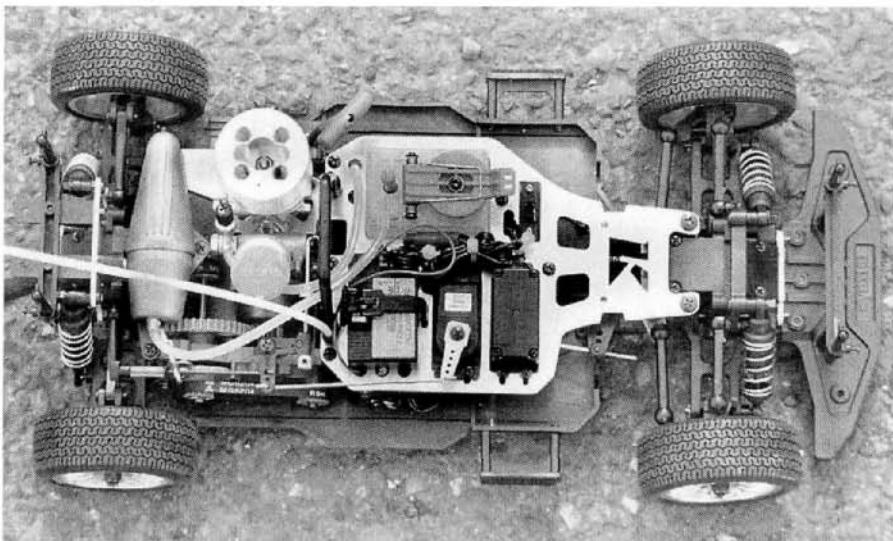
I chose to build the Stingray from a beginner's standpoint, so I installed an Airtronics\* Rival radio with two 94102 servos. I wanted a strong servo for the steering, and the 94102s are among the strongest standard servos on the market. The Rival is very comfortable to hold, has lots of standard features for a beginner radio, and it's available for about \$75.

## PERFORMANCE

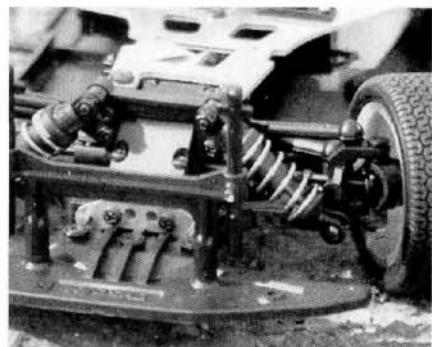
I packed up all the items needed to run a gas car, including fuel, a fuel bottle and a glow-plug igniter, and headed to a local



***Throttle linkage is easy to adjust and trim to your radio system. I added more fuel tubing to the brake side to tighten up response and make braking more adjustable.***



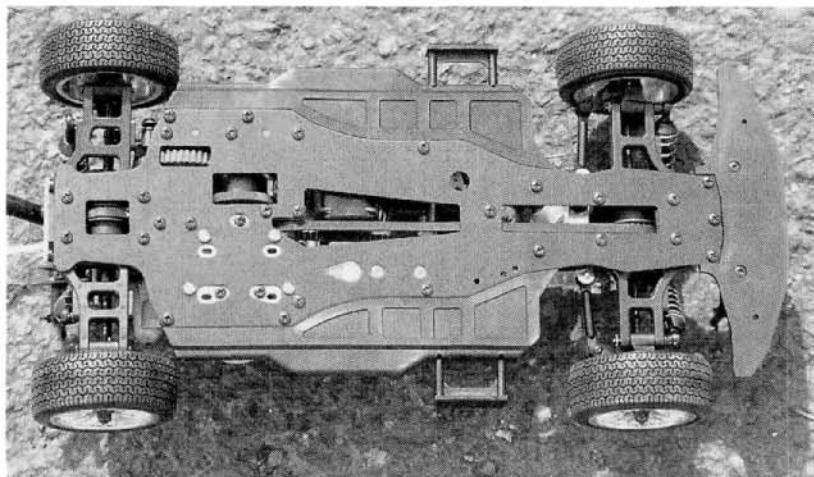
***As you can see, the overall layout of the GP-10 is well-thought-out and keeps everything neat and tidy. The aluminum radio tray adds to the rigidity of the chassis.***



***Standard A-arm front suspension—a tried-and-true design that is very durable. The shocks aren't oil-filled and the fixed upper camber links are not adjustable, but overall, the car handles well. Kyosho offers a full line of hop-ups that include adjustable tie-rods and aluminum-body, oil-filled shocks.***

mall that had a patch of newly laid asphalt in one corner. An important note: before running your car on any parking lots, be sure to check with the owners of the property to be sure it is OK. I also bribed Dave Ehrlich, an  $\frac{1}{8}$ -scale gas racer friend of mine, to come along as test driver while I snapped some pictures.

The included GS-11X engine started up with just a couple of tugs on the pull-starter and purred like a kitten. The first pull on the throttle was a pleasant surprise. It took the clutch a second to engage, but once it did, the Corvette took off! We really drove the car fairly hard. Going full speed and cranking the wheel one way and then the other didn't seem to faze the 'Vette. The lack of oil-filled shocks didn't seem to affect the handling except over the really big bumps (oil-filled shocks are one of the first things I would add—right after bearings). The car is very well-balanced and handles turns in either direction at any speed with the



**A nice black-anodized chassis is the backbone of the Corvette. Countersunk screws would have been a nice touch. The kit screws did scrape a little on the rough surfaces I tested on.**

last very long, showed very minimal wear. The belts never slipped once and the tires held up well, showing some scrubbing on the edges. The car was in excellent shape considering the pounding we gave it (this is a "Thrash" Test, right?).

#### FINAL THOUGHTS

I'm sure the Kyosho engineers never intended the 'Vette to be a competition-racing vehicle. Emphasis was placed on scale representation of a classic automobile. In my humble opinion, they succeeded with a very

#### THINGS YOU'LL NEED

- 2-channel radio with two servos.
- Glow fuel (10- to 15-percent-nitro content recommended).
- Fuel bottle (for easier fueling).
- Plenty of spare time to have lots of fun driving your new 'Vette.
- Glow-plug igniter.



#### Factory Options

- 2-speed transmission—part no. 39431.
- Ball bearings—1901 and 1911.
- Ball differentials—39506.
- Stainless-steel brake disk—SPW-51.
- Scale muffler—39512.
- Belt-tensioner post—SPW-55.
- Stabilizer set—SPW-56.
- Center one-way unit—SPW-57.
- Center belt tensioner—SPW-58.
- Front one-way unit—W-5111.
- Touring shocks—W-5151.
- On-road spring set—92491.

## Building & Setup Tips



- Read the directions thoroughly before you start.
- Be sure to lubricate all bushings completely. Don't be afraid to use the supplied grease.
- Study the pictures of screws carefully. Screws of the same length and diameter come with several sizes of head to suit a variety of applications.
- I put extra fuel tubing on the brake linkage to make adjustments easier and more precise (instructions call for a  $\frac{1}{2}$ -inch length; I used a 1-inch piece).



#### LIKES

- The instructions are very clear and easy to follow.
- The fit of the parts is excellent and the kit went together easily.
- The body, the body, the body. It is awesome.
- The engine is included—not the most powerful, but easy to tune and runs great.



#### DISLIKES

- The belts are very loose and the kit should include some sort of tensioning device—not just as an option.
- Non-adjustable linkages.
- No oil-filled shocks.
- The use of round-head screws on the chassis plate; countersunk screws are less likely to drag on the ground.

greatest of ease. The treaded tires got very good traction on the pavement, and the 4WD kept the 'Vette hooked up.

I handed the transmitter over to my friend Dave and watched his face light up as he started putting the 'Vette through its paces. Slamming on the brakes, sliding through the corners and executing four-wheel drifts through some of the dirtier parts of the pavement became the order of the day. Keep in mind that Dave is a sponsored driver for a national team and is used to driving  $\frac{1}{8}$ -scale cars at 60mph plus. He wouldn't give me back the radio. He told me I had to give him the car or he would steal it. We agreed that this car was fun.

After running about four or five tanks of fuel, we inspected the car. The plastic brake disk, which I had thought wouldn't

fine offering at a fairly reasonable price.

Other cars in the series include a Ford GT-40, a Ferrari 250 GTO, a Ferrari 330 P4, Cobra Daytona Coupe and an MGB Mk.1 open-top roadster with a driver figure. I checked the fit of other bodies, and the sedan bodies for my Kyosho TF-2 will fit this chassis with a slight adjustment of the body posts. If you and your friends want to do some racing, I suggest that you put the kit body on the shelf for display and get a second, "beater" body for some fender-rubbing gas racing.

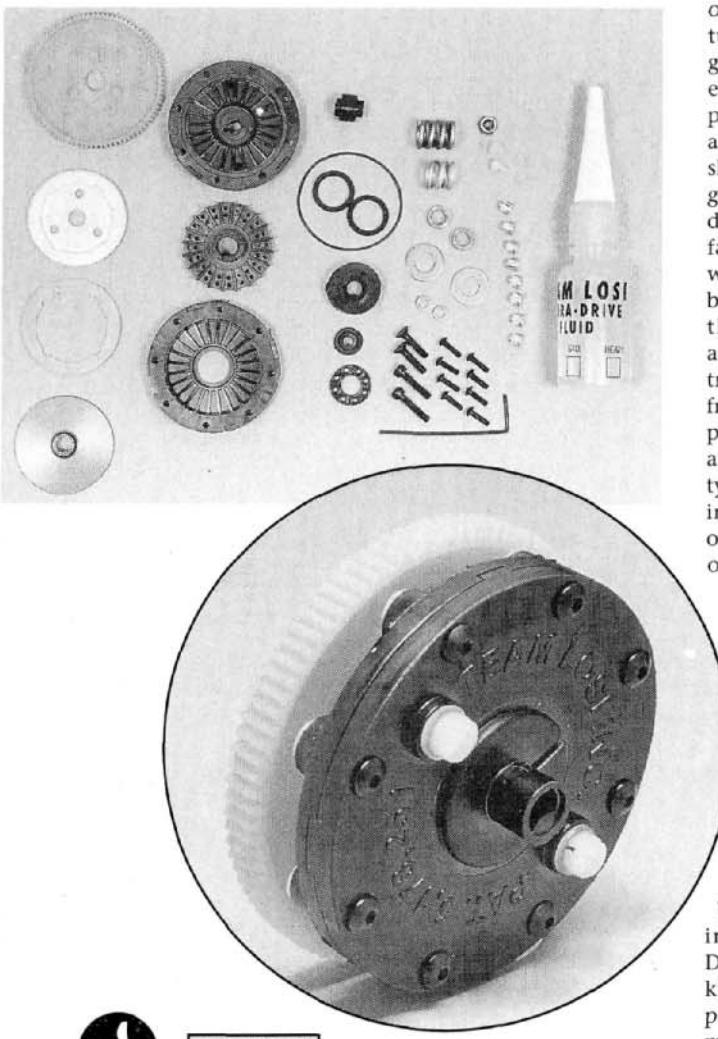
If the Corvette model is any indication of the quality of the other models in the line (which I am sure it is), then they'll all be fine additions to any R/C model collection.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.

# SPIN doct

by Jim Knepley

## Team Losi's Hydra Drive



### LIKES

- Comes with Double-X and Double-XT kits.
- Is relatively inexpensive as a hop-up.
- Is easy to install and remove.



### DISLIKES

- Needs specialized fluids.
- Friction slipper and Hydra are not adjustable separately without changing fluid.

**M**ANY FACTORS are critical during a race, and getting good traction is one of them. Fast motors are virtually useless if the wheels can't get any grip. To compensate for electric motors' "instant-on" powerband, most off-road buggies and trucks are equipped with a slipper clutch. Slipper clutches are good for controlling wheelspin during hard acceleration, but they fall short on rough terrain. One way to maintain traction on bumpy tracks is to use a system that can, to a certain extent, adjust to the available surface traction to help prevent the tires from breaking loose. Regular slipper clutches need a constant amount of torque to slip. This type of slipper can cause difficulty in maintaining traction on various irregular surfaces or portions of a track.

The Losi\* Hydra Drive is a very commonly used speed- and traction-sensitive slipper clutch. The Schumacher\* Visco Drive is a relatively new product that functions like the Hydra Drive. How do these units' construction and performance compare? Keep reading.

### TEAM LOSI HYDRA DRIVE

The Losi Hydra Drive is included in the Double-X buggy and Double-XT truck kits and is very popular among modified drivers on rough tracks. With the proper layshaft, the Hydra Drive can also be used on Associated\* and Schumacher cars.

The unit consists of two halves molded of

a specially formulated, high-temperature, hard plastic and is held together by eight screws. Inside, a plastic, molded disk (impeller) spins through a special silicone fluid. Both the impeller and the inside of the housing have ribs that create more friction through the fluid. These ribs are very close together (within a few thousandths of an inch) when the impeller is placed in the housing. To adjust to different track conditions, you refill the assembled unit through holes in the outer housing with oils of various thicknesses. Two O-rings keep the oil inside. Although the unit is simple to look at, the design is surprisingly clever.

The impeller has notches that allow it to be attached to the spur gear. The entire unit is held on the spur gear with a spring that is used to adjust the slipper clutch. The stock friction slipper assembly remains unchanged with the Hydra Drive attached.

The Hydra unit is a supplementary part of the slipper assembly that works with the standard slipper. This makes adjustments easy and familiar to anyone who has experience with a standard slipper clutch. I want to emphasize that the Hydra Drive was not designed to solely help drive the car as a slipper unit. It complements the standard slipper and enhances

the car's overall performance. Be sure not to run your vehicle with the Hydra Drive set too loose, or it may become damaged by the excessive heat.

### SPECIFICATIONS

#### LOS HYDRA DRIVE

##### List price

\$29.95

(not including layshaft for non-Losi kits)

##### Weight

(including slipper assembly;  
excluding spur gear and layshaft)

Approx. 1.3 ounces

##### Fluid

Requires Hydra  
Drive fluids.

### SCHUMACHER VISCO DRIVE

The Schumacher Visco Drive has

# ORS *Both improve traction, but is one better than the other?*

a more complex design than the Hydra Drive, but it serves the same function. With the proper layshaft, the Visco Drive can be attached to Schumacher, Associated and Losi cars.

The Visco Drive has two sections: the viscous coupling and the traditional slipper assembly. The sections are combined in one sealed package. In the viscous coupling, two thin aluminum plates are pressed together and separated by silicone shock oil (the kit comes with a supply of 40WT oil). The distance between these plates may be adjusted from the outside. The shearing force of the oil against the plates creates friction. Decreasing the distance between the plates causes more shearing force and, therefore, more "drive." Automotive buffs might recognize this design as an automatic transmission's torque converter.

The spur gear is attached to the aluminum housing with an unconventional but effective O-ring system. You must use one of the included Schumacher spur gears with the Visco Drive because it locks in the external adjustments after you have made them. The entire unit slips onto a specialized layshaft and is held in place by a spring and nut that adjust the pressure on the slipper pad. If you want to use a slipper clutch only, you must replace the layshaft with the stock part—something you don't have to do with the Hydra Drive.

Because the Visco Drive is aluminum, if it is adjusted incorrectly, chances are that it won't

sustain permanent damage from overheating.

#### PERFORMANCE

Both units were tested in four models: a Schumacher Cougar 2000 '95 Team, a Schumacher Storm 2000, a Losi Double-X and a Team Associated RC10T2.

- **Hydra Drive.** The test unit was filled with medium Hydra fluid, and the slipper was set to minimize wheelspin off the line. When I used the unit with a stock motor, there was a slight power loss. Tightening the Hydra seems to prevent the power loss. Running thicker Hydra fluid would accomplish the same thing while allowing the Hydra to run more loosely. This is because the thicker fluid's extra viscosity makes the slipper's Hydra portion drive the vehicle harder (it hooks up harder and faster). Whether it was attached to a buggy or truck, the Hydra Drive performed well through rough track sections and over jumps.

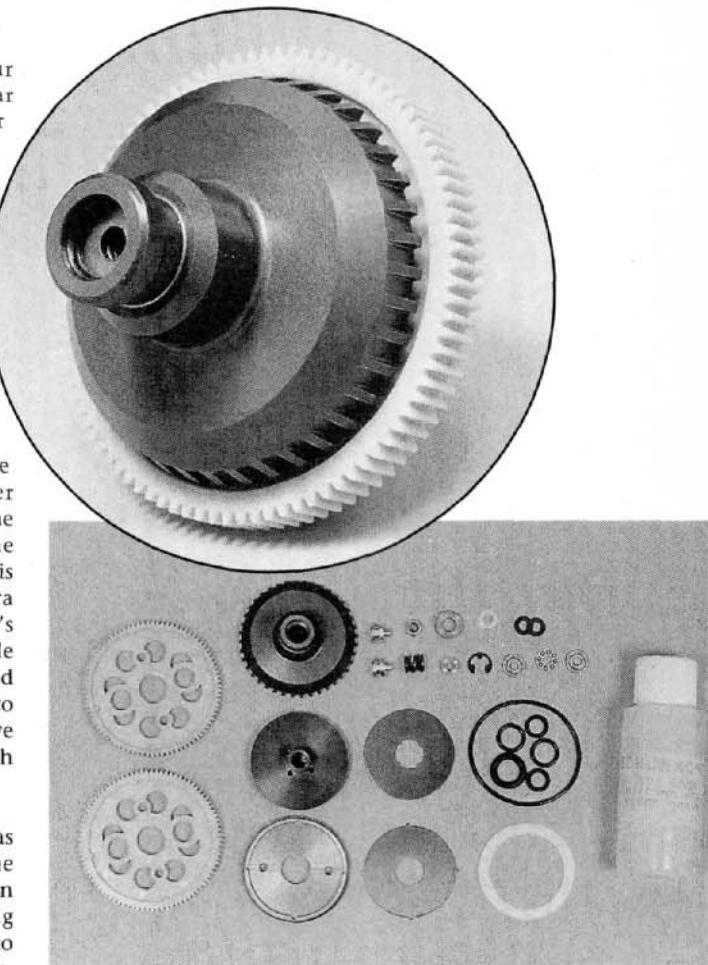
- **Visco Drive.** The test unit was filled with 40WT shock oil. The plates were set at eight teeth open (the recommended starting point), and the slipper was set to minimize wheelspin off the line.

After jumps, the vehicles landed more softly and were able to run over rough terrain with more speed than they could with a slipper alone. With a stock motor, the test settings made the Visco Drive absorb too

SPECIFICATIONS	
<b>SCHUMACHER VISCO DRIVE</b>	
<b>List price</b>	\$59.95
	(plus \$7.95 to \$15.50 for layshaft)
<b>Weight</b>	(including slipper assembly; excluding spur gear and layshaft)
	<b>Approx. 1.1 ounces</b>
<b>Fluid</b>	Any silicone shock oil can be used.

(Continued on page 194)

#### Schumacher's Visco Drive



PHOTOS BY WALTER SIDAS



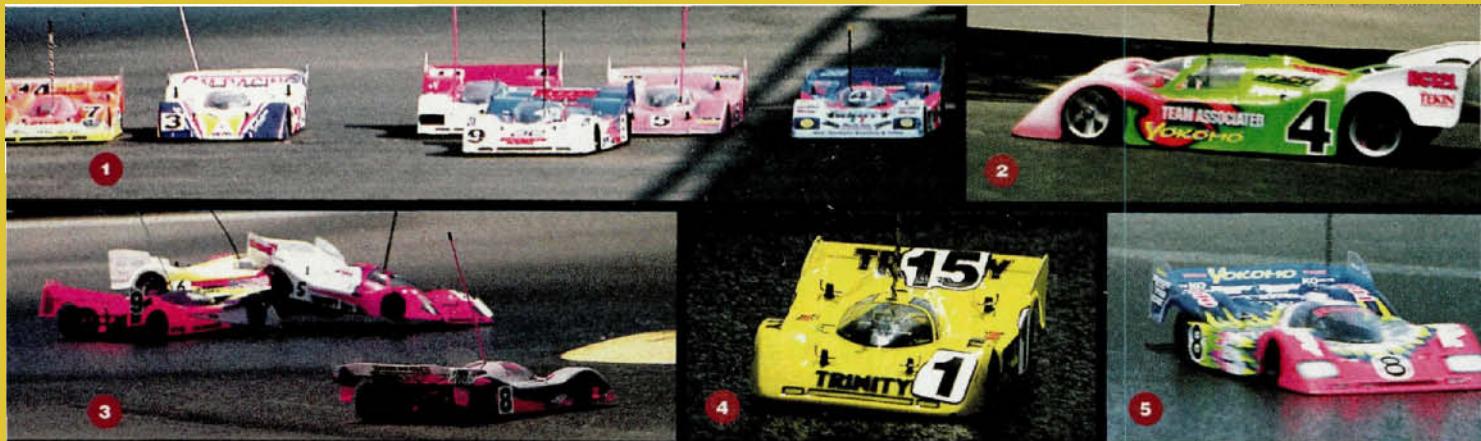
#### LIKES

- Has aluminum housing.
- Uses standard shock oils.
- Can be adjusted from the outside without an oil change.

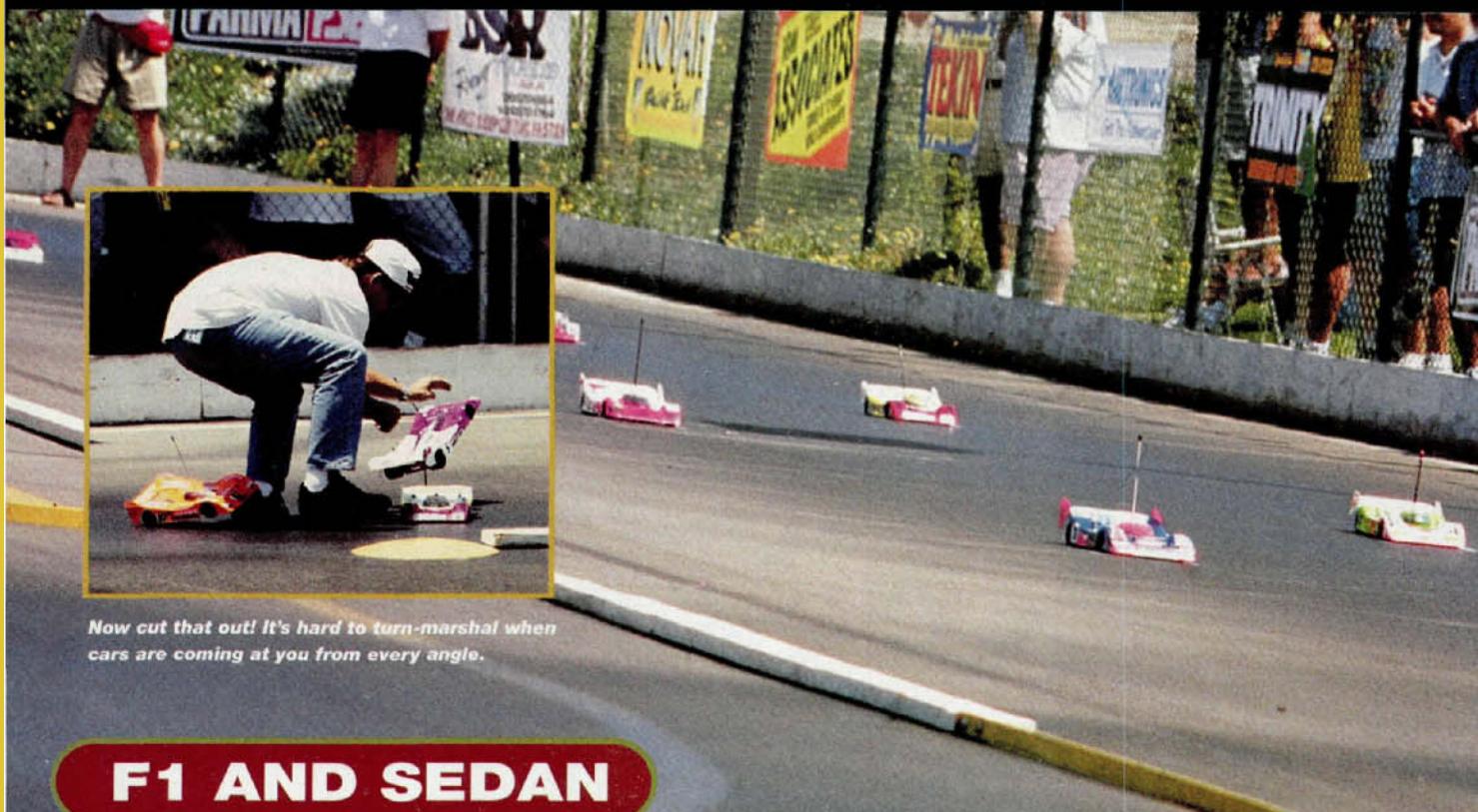


#### DISLIKES

- Requires Schumacher spur gears.
- Leaks a bit.
- Requires a different layshaft, so it can't be quickly added or removed.



1. The start of the 1/10-Scale A-1 Main. 2. Aesthetics is everything, man! 3. Hey, is that Joel's car getting some air? 4. Brian Kinwald's Switchblade car. What happened to your usual colors, Brian? 5. Masami's car is almost as colorful as his clothes! 6. A view of the drivers' stand before the start of the 1/10-Scale A-1 Main.



Now cut that out! It's hard to turn-marshal when cars are coming at you from every angle.

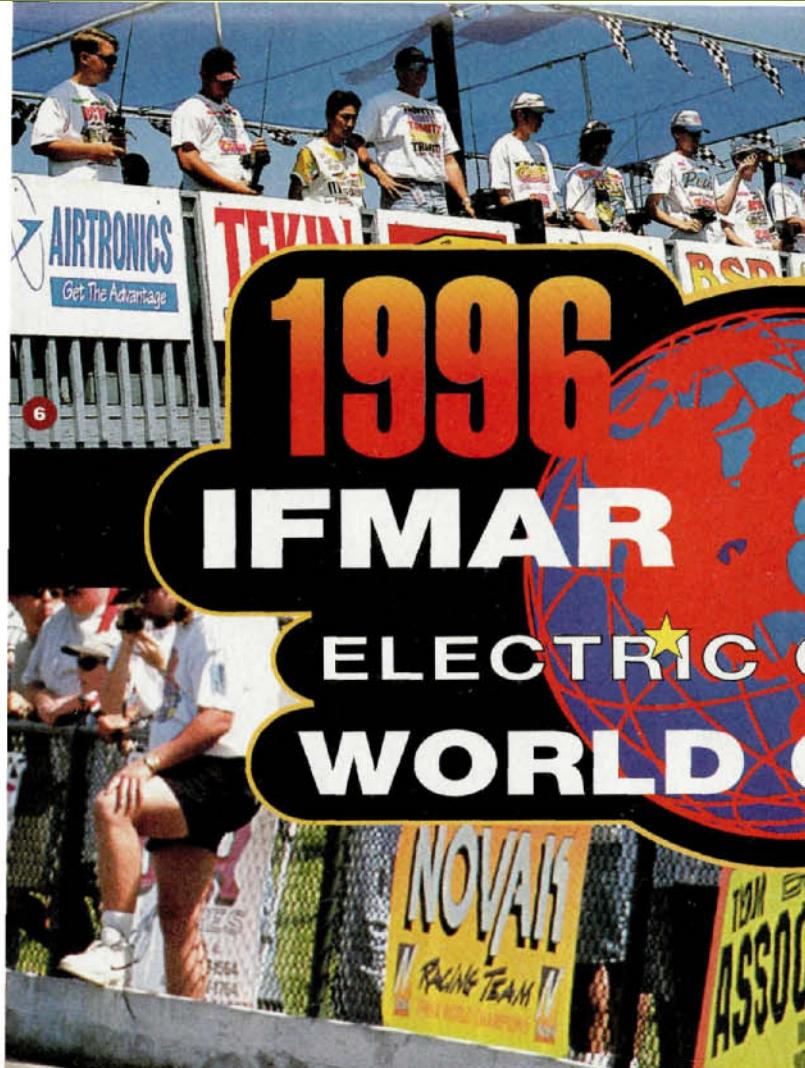
## F1 AND SEDAN Demo Race



Two touring car and F1 exhibition races were held to commemorate the addition of these new, exciting racing classes to the IFMAR roster. The first—The Manufacturers Showcase—was held during the 1/12-Scale Mains. The contestants represented various F1 and touring-car manufacturers and distributors. Reedy\* Modifieds provided the batteries and motors for all the drivers who competed. The contestants in the second exhibition race consisted of Revelation Raceway's top point-series drivers. The motors and batteries were provided by Trinity, while Pro-Line\* supplied the Speed Hawg tires for both exhibition races.

As expected, the racing was tremendous, especially in the touring-car class. Touring-car racing is one of the few classes where "rubbing" is acceptable—only to a degree, of course. Well, the word "rubbing" might be putting it mildly, because a lot of paint was exchanged while the cars crashed, rolled and were punted from one end of the track to the other. Although there were no official winners and no trophies were awarded, the fun was evident from the laughter on the drivers' stand. I only hope that this class manages to retain that element of fun when it becomes a full-blown racing class.

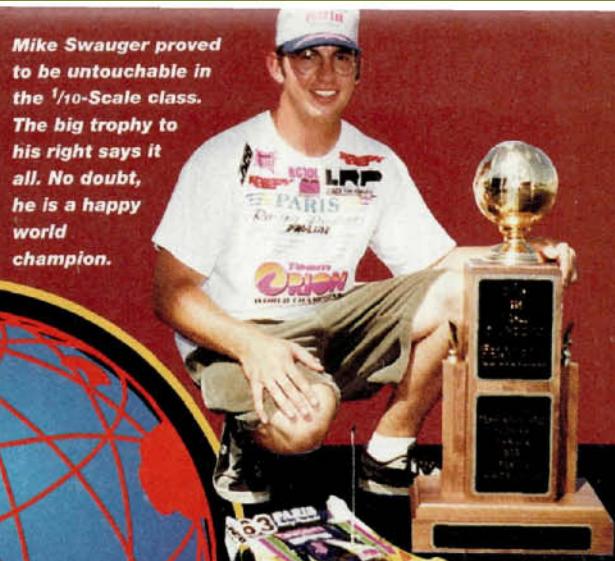
PHOTO BY GEORGE M. GONZALEZ



# 1996 IFMAR ELECTRIC ON-ROAD WORLD CHAMPS



Mike Swauger proved to be *untouchable* in the  $\frac{1}{10}$ -Scale class. The big trophy to his right says it all. No doubt, he is a happy world champion.



# 1997

by GEORGE M. GONZALEZ

EVERY TWO years, the International Federation of Model Auto Racing (IFMAR) organizes the  $\frac{1}{12}$ - and  $\frac{1}{10}$ -Scale Electric On-Road World Championships, where two World Champions are crowned. Earning the title of world champion is by far the greatest achievement an R/C car racer can possibly attain, and it's known to open doors as far as promotions and endorsements are concerned.

The driver is not the only one who benefits from capturing such a prestigious title; the car, motor, battery and tire manufacturers that sponsor the winning driver also benefit greatly. Wouldn't you want to have the products that were used to win the Worlds on your car? Well, it's this kind of exposure that makes the IFMAR World Championship the equivalent of the *Good Housekeeping* Seal of Approval.



Top: Masami taking a shower. Right: a colorful world champion. Masami Hirosaka not only took TQ honors, but he also won the  $\frac{1}{12}$ -Scale World Championship with ease. Masami's T-shirt and pants were custom-painted by his grandfather.





Left: Team Associated's Gene Husting has a few words with world champ Oscar Jansen. Bottom: Rick Howart works on his rig.



The '96/'97 Worlds attracted the planet's best on-road drivers, and more than 13 countries were represented. Because of a relatively small turnout, applications were taken at the door, and anyone who was willing to plop down \$150 and fill out an entry form was given an opportunity to compete. As it turned out, more than 90 racers competed in  $\frac{1}{12}$  scale and approximately 115 racers competed in  $\frac{1}{10}$ -scale—rather respectable numbers, in my book.

Three practice rounds and one controlled practice heat were available to all contestants. Heats were organized and shuffled, so the contestants could practice at different times during the day. This was important because the track conditions

worsened as the day progressed and the outside temperature approached 100 degrees (see the "Traction Talk" sidebar).

Each class consisted of nine Qualifying rounds, which gave the contestants plenty of chances to qualify for the A-Main and compete for the world championship. Nine rounds of Qualifying may seem a little excessive, but the racers who qualified for the A-Main in the ninth round certainly weren't complaining. I guess there's truth to the saying; "There are two

Brian Kinwald—calm and cool as always.

sides to every coin." The drivers who got bumped out of the A-Main during the final



A view of the covered pits.

Left: Team Associated's Gene Husting has a few words with world champ Oscar Jansen. Bottom: Rick Howart works on his rig.



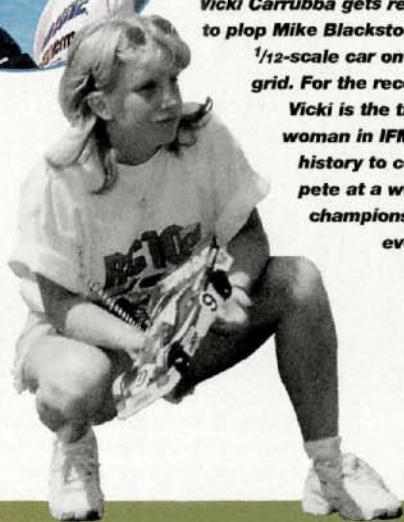
round of Qualifying were bummed—big time!

The top 10 drivers in each class advanced to the A-Main. The top 10 then faced triple A-Mains in which points were accumulated according to finishing position (100 points for first place, 99 for second, 98 for third and so on). The drivers' worst scores were discounted and used only in the event of a tie. The driver with the highest score was declared champion.

Mark Pavidis puts on his war face.



Vicki Carrubba gets ready to plop Mike Blackstock's  $\frac{1}{12}$ -scale car on the grid. For the record, Vicki is the third woman in IFMAR history to compete at a world championship event.



## The Track



**R**evelation Raceway is a relatively new track, but in a short time, it has become Southern California's premier on-road racing facility. The large outdoor track is equipped with AMB lap counting, a first class, two-story drivers' stand, a covered pit area and perimeter lights that make night racing possible. Track owners Dana and Rachael Smetzer and their manager, Dan Disenza, did a fine job preparing the facility for the World Championships.

Unfortunately, some bottlenecks were reported during the two week event. I won't go into details on why there were so many delays, but I honestly thought that the event could have been organized much better. I also felt that the prayer ceremonies that were broadcast over the PA system at the start of the Mains were not necessary. Don't get me wrong, but the facility was filled with many international guests, some of whom may have different religious beliefs. While I'm nitpicking, I should mention the busy railroad track that ran less than 100 feet from the track. Every 10 minutes or so, the railroad crossing bells would chime, the ground would shake, and a train would come blazing by with its whistle blowing to high heaven. I didn't hear any of the drivers complain about the trains, but even so, I did find it rather annoying.

I still think that Revelation Raceway did an admirable job. Keep in mind that this was the first big race they had hosted, so some mistakes were bound to happen. I know one thing for sure; they will be better prepared for any other high-profile racing events that might come their way.



howdy!

## Masami Speaks

**S**hortly after Masami Hirosaka totally dominated the 1/12-Scale class and secured the world championship, I pulled him aside and we had a little chat. The following is a short interview with Masami with the aid of an interpreter. Just for the record, Masami does speak English, but he wanted to be sure his answers were as articulate as possible.

**GG: Congratulations on your fantastic performance. What can I say? You're awesome!**

**MH:** Thank you. I think your magazine is awesome, too.

**GG: What is going through your mind right now?**

**MH:** I am very happy, but I'll be even more happy if I win the 1/10-Scale World Championship as well.

**GG: What do you think about the competition? Were things tougher this time around?**

**MH:** This race was quite hard compared to some of the other world championships. In fact, it was one of my greatest challenges.

**GG: What are your thoughts about racing on asphalt instead of on carpet like the last world championship?**

**MH:** No thoughts in particular. Carpet, asphalt. It makes no difference as long as all the other drivers race on the same kind of surface.

**GG: Any thoughts on the track, the**

**facility, the crew? Did you think the event went smoothly?**

**MH:** I think that the race went very well. I didn't have any problems, and the crew was very helpful.

**GG: During several of the Qualifiers, I noticed that you timed the other racers with a chronograph. Why do you do that? Is it because you want to know how well your competitors are doing?**

**MH:** I time all the Team Yokomo drivers; that is, the drivers who drive Yokomo cars, such as the YZ-10 off-road buggy. I also do it because it's fun, and it's also a good way to pass the time when I'm not busy.

**GG: Who did you feel was your toughest competitor in 1/12-Scale?**

**MH:** All of them because they are all fast. I've learned the hard way to never underestimate my competition.

**GG: I've noticed that you always exercise before the mains. I've seen you run in place, do jumping jacks and**

**perform all kinds of unusual stretching routines. What's up with that?**

**MH:** It gets my blood circulating, warms me up and helps me relax.

**GG: Do you use a particular strategy when you race, or do you just improvise according to how the race is going?**

**MH:** I always try to be up in front when the race starts. Qualifying first is extremely important. If, for some reason, I end up in the back of the grid at the start of the race, I try to stay calm and relaxed and to drive modestly. The race isn't won at the start; it's the car that crosses the finish line first that wins the trophy.

**GG: Before I let you go, are there any words of wisdom you might want to pass along to our readers?**

**MH:** First and foremost, remember to enjoy yourself. That is why you got involved in this hobby, isn't it? Racing can be very stressful if you take it too seriously.



### 1/12-SCALE

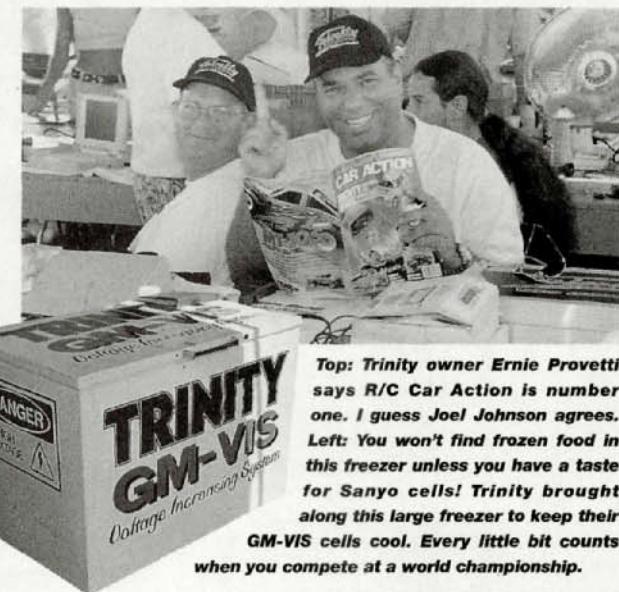
• **Qualifying.** Team Maxtec\* driver Barry Baker set the TQ pace early on by posting a 23:8:13.25 in the fourth round. There's no doubt that Baker had his car dialed, but I saw by his performance that there was room for improvement. My observation was correct; Team Associated\*/Team Yokomo\* driver Masami Hirosaka ran a perfect race in the seventh round and obliterated Baker's best time by over 5 seconds!

I had goosebumps when watching Masami skillfully pilot his Associated RC12L. He kept his car within millimeters of the corner markers and drove it on such a tight line that I think he heated up the washboards! I believe it would have been impossible to shave off any more time from his seemingly perfect run—errie precision!

As expected, Masami's best time (23:8:08.75) held up until the very end, and that gave him a front-row ticket on the starting grid. Barry Baker, Mike Swauger, Brian Kinwald, Jon Orr, Joel Johnson, Craig Drescher, Paul Wynn, Mike Blackstock and Ryuzo Nakayama all had exceptionally clean performances and qualified for the A-Main.

• **A-Main: Round 1.** At the sound of the tone, it was Masami Hirosaka who led the pack around the course at a superfast 21.6 pace. Barry Baker, Team Associated's Mike Swauger and Team Trinity's\* Brian Kinwald followed at a close, but not close enough, pace. Baker waited for a golden opportunity to challenge Hirosaka for the lead. The real battle, however, was for the third place, because Kinwald began to close the gap on Swauger.

Entering the S-turns, Swauger came in a little wide and let Kinwald sneak past him. Within seconds, Kinwald was knocking on Baker's back door. At the 3-minute mark, entering turn 7, Kinwald made a bold move on Baker: he went into the corner tight and used Baker's car as a guardrail. Needless to say, Kinwald was now second and Baker was third. Kinwald was on Hirosaka's tail, and the spectators circling the track were going absolutely nuts. (No doubt, Kinwald has many loyal fans.)



**Top:** Trinity owner Ernie Provetti says R/C Car Action is number one. I guess Joel Johnson agrees.

**Left:** You won't find frozen food in this freezer unless you have a taste for Sanyo cells! Trinity brought along this large freezer to keep their GM-VIS cells cool. Every little bit counts when you compete at a world championship.

With the race half over, Hirosaka was still in the lead with Kinwald following eagerly. At the 5-minute mark, Baker tried to get back at Kinwald by making an aggressive inside pass, but Kinwald slammed the door on him. Moments later, Baker literally punted Swauger's car off the track in an effort to catch up to Kinwald. This gave Team Associated's John Orr and Team Trinity's Joel Johnson the opportunity to move up to where the action was.

With 6 minutes down, Kinwald started to reel in Hirosaka. Kinwald made several attempts to pass, but Hirosaka kept shaking him off like a pesky fly that kept nibbling on his neck. Kinwald persistently challenged Hirosaka, but Baker was now all over Kinwald's back door. With 30 seconds left, Baker skillfully got around Kinwald and ended up behind Hirosaka's pink-and-green Associated RC12 prototype. Baker seemed content with his position; he never challenged Hirosaka and crossed the line in second.

Hirosaka collected 100 points for the win. Baker claimed 99 points, and Jon Orr won the battle against Joel Johnson for third. Kinwald's batteries dumped, and he crawled in in seventh. At the end of the race, IFMAR officials were called in because there was a rough-driving claims between Kinwald, Baker and Swauger. In the end, the dispute was resolved, and all three received warnings.

**Round 2.** Again it was Masami Hirosaka out in front. Barry Baker, Mike Swauger and Brian Kinwald followed Hirosaka like a freight train from hell. A pileup going through one of the corners, however, mixed things up, and somehow Joel Johnson ended up in second, while Baker, Swauger and Kinwald tried to sort out who would claim third. Two minutes went by and Hirosaka was already halfway back to Japan. Joel Johnson was way behind in second, while Swauger and European champion Craig Drescher negotiated third.

Going through what the announcer



called the "Baldwin Curl," Johnson ran into some trouble and was forced to let Swauger by to claim second. Drescher also managed to squeeze by Johnson and inherited third. With 4 minutes down, Swauger started to really turn it on and posted lap times in the 21.5 range. Before Swauger knew it, he was less than a second behind the leader, who was posting 21.9 lap times (talk about close racing!).

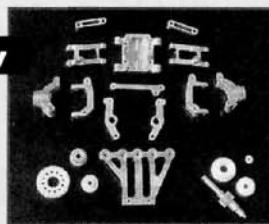
The action really got hot as only 0.2 second separated first and second. Swauger was glued to Hirosaka's tail! Once again, the audience responded with cheers that would

## New in the Pits

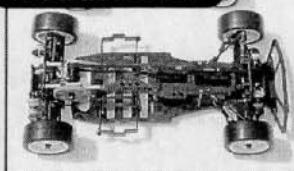
**M**any new cars and products were introduced at the IFMAR Worlds. Here are just a few. Check out Chris Chianelli's special "Inside Scoop" in this issue for a look at some of the other new products that made their debut at the Worlds.

Trinity has announced that it will soon carry a line of hop-up parts for the Tamiya TA03 touring sedan. Trinity has a ton of machined-aluminum parts such as suspension arms, steering uprights, rear-axle carriers, steering bellcranks, upper camber links, front motor guards and much more. Also on their way are an assortment of high-performance transmission gears. We'll keep you posted on the availability of the products, so be on the lookout. For more information, give Trinity a call at (908) 862-1705.

### Trinity



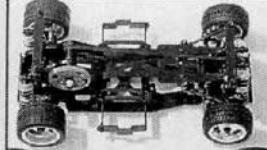
### Roadrunner



This new Japanese company has introduced two cars that are bound to catch

the interest of racers and enthusiasts worldwide. The Roadrunner\* Express (top) is a 1/10-scale belt-drive, 4WD sedan chassis, and the GTO 962K is a 1/12-scale, or "M"-scale, belt-drive 4WD "mini" sedan chassis. Both cars feature double-deck graphite chassis, graphite shock towers, twin-belt 4WD drive systems with front and rear ball diffs, full bearings, 4W independent suspension with oil-filled shocks and a unique rising-rate caster front end. The Express was designed to use either stick- or saddle-pack battery configurations.

For more information, call GHI/Ultimate hobbies at (714) 921-0322.



### Protoform

Protoform's\* Peugeot 9058 body was molded after the Peugeot Group C racers that dominated the European Group C series and the 24 Hours of Le Mans in the early '90s. The full-scale body was designed by a French aerospace company and was unique in appearance and function. The cars were raced with a variety of front- and rear-wing configurations to suit different track conditions. Now Protoform provides three versions of this body. Each has a different wing profile, which aids in the dialing-in process. The body is available in 0.030 Lexan and superlight 0.025 Lexan; the choice is yours. All versions cost \$19.95; part no. 1707H—high downforce; 1707M—medium downforce; 1707L—low downforce. For more information, call Protoform at (905) 646-7638.

### Ballistic Batteries

Patrick Kivin from Ballistic Batteries\* gave me a quick demo of two products. The Ballistic Pro Trac DC charger has a large LCD, 10 function buttons, 10 charge modes; and it can cycle packs at 20 amps and monitor each cell while charging and discharging. It can also print graphs and display vital information such as power numbers, capacity and resistance.



The Ballistic Intensive Care Unit is a battery equalizer. It is powered by your power supply and is microprocessor controlled. The unit was designed to discharge each cell individually and cut off when it reaches 0.01 volt. It's easy to operate

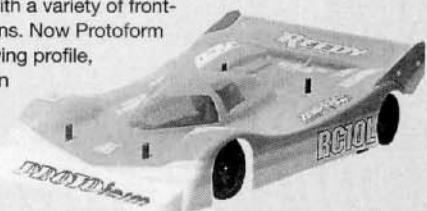
and can not reverse the polarity of your cells. For more information, give Patrick a call at (602) 493-3717.

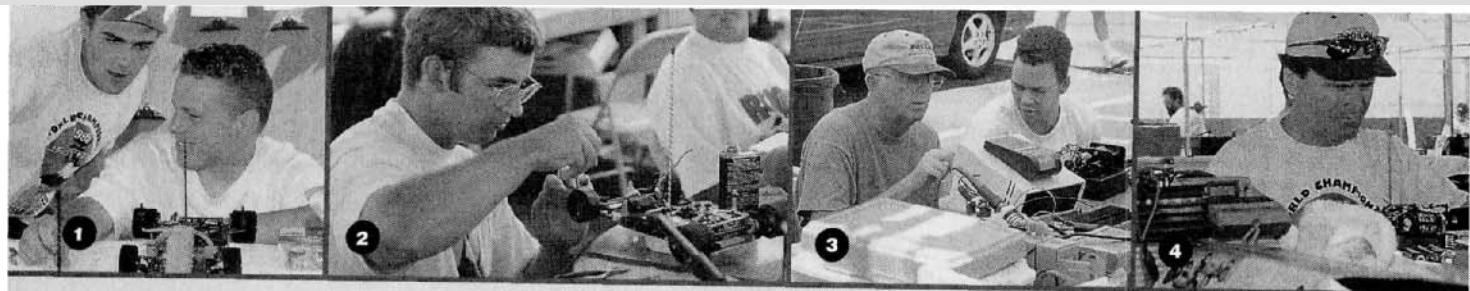


### Yokomo

Masami Hirosaka and Barry Baker both drove

Yokomo's YRX-10 prototype. The car's most unique features are its unconventional battery-mounting system and wishbone-shaped, two-piece T-bar. Three batteries are mounted in-line and three batteries are mounted across the chassis—an arrangement that, according to Yokomo—provides superior weight distribution. No word as yet about price and availability, but if the car does become available, GHI/Ultimate Hobbies will be the importer. For more information, call GHI/Ultimate Hobbies at (714) 921-0322.

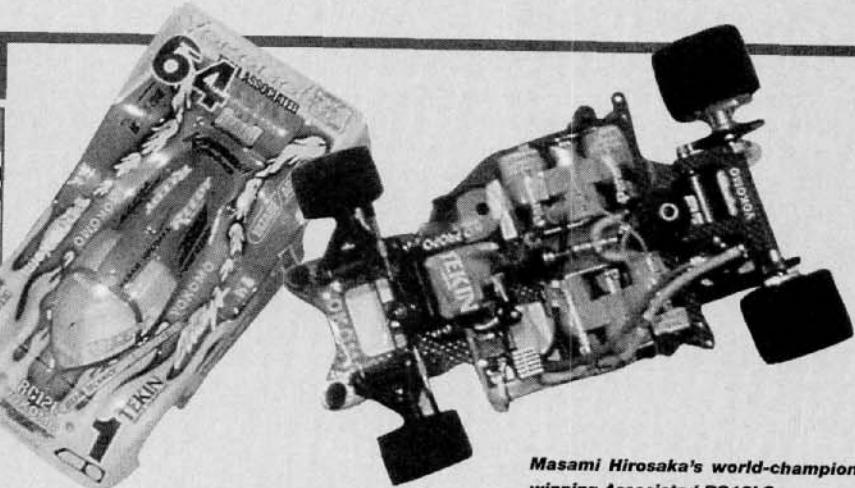




## 1/12 Scale Winners



The top three 1/12-Scale winners and their cars (left to right): Mike Swauger (third), Masami Hirosaka (first) and Barry Baker (second).



Masami Hirosaka's world-championship winning Associated RC12LC.

Fin. Qual.	Driver	Chassis	Motor	ESC	Radio	Receiver	Batteries	Body	Tires(F/R)	Traction Additive	Pinion/Spur
1	1 ...Masami Hirosaka	Assoc.	Reedy	Tekin	KO Propo	Tekin	Yokomo	Protoform	Jaco/Jaco	Paragon	24/100
2	2 ...Barry Baker	Assoc.	Maxtec	Tekin	Airtronics	KO Propo	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	24/100
3	3 ...Mike Swauger	Assoc.	Reedy	LRP	Airtronics	NA	Orion/Reedy	Andy's	Jaco/Jaco	Paragon	22/100
4	7 ...Craig Drescher	Assoc.	Reedy	LRP	Sanwa	NA	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	24/100
5	5 ...Jon Orr	Assoc.	Reedy	Novak	KO Propo	Novak	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	22/100
6	6 ...Joel Johnson	Trinity	Trinity	Novak	Airtronics	Novak	Trinity	Protoform	Jaco/Jaco	Trinity	25/100
7	9 ...Mike Blackstock	Wood	Maxtec	Tekin	Airtronics	Tekin	Orion	Protoform	Jaco/Jaco	Paragon	27/100
8	4 ...Brian Kinwald	Trinity	Trinity	Tekin	Airtronics	Futaba	Trinity	Protoform	Jaco/Jaco	Trinity	30/100
9	8 ...Paul Wynn	Assoc.	Reedy	Tekin	Airtronics	Tekin	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	24/100
10	10 ...Ryuzo Nakayama	Assoc.	Reedy	Tekin	KO Propo	KO Propo	Yokomo	Protoform	Jaco/Jaco	Paragon	24/100

## 1/10 Scale Winners



The top three 1/10-Scale winners and their cars and trophies (left to right): Josh Cyrul (third), Mike Swauger (grand champion) and Barry Baker (second).



Mike Swauger's world-championship winning RC10LC.

Fin. Qual.	Driver	Chassis	Motor	ESC	Radio	Receiver	Batteries	Body	Tires(F/R)	Traction Additive	Pinion/Spur
1	1 ...Mike Swauger	Assoc.	Reedy	LRP	Airtronics	Airtronics	Orion/Reedy	Andy's	Jaco/Jaco	Paragon	22/115
2	3 ...Barry Baker	Yokomo	Maxtec	Tekin	Airtronics	Futaba	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	23/120
3	2 ...Josh Cyrul	Assoc.	Reedy	Novak	Futaba	Futaba	Reedy/Orion	Assoc.	Jaco/Jaco	Paragon	23/120
4	5 ...Joel Johnson	Trinity	Trinity	Novak	Airtronics	Futaba	Trinity	Protoform	Jaco/Jaco	Trinity	21/120
5	6 ...David Spashett	Corally	Corally	Novak	JR	KO Propo	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	20/120
6	7 ...Tony Neisinger	Assoc.	East Coast	Tekin	Airtronics	Tekin	Orion/Reedy	Andy's	BSR/BSR	BSR	23/120
7	4 ...Masami Hirosaka	Yokomo	Reedy	Tekin	KO Propo	KO Propo	Yokomo	Protoform	Jaco/Jaco	Paragon	21/115
8	8 ...Sakke Ahonlemi	Assoc.	Peak Perf.	LRP	Airtronics	Tekin	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	21/116
9	9 ...Mike Lufaso	Assoc.	Reedy	Novak	Airtronics	Novak	Orion/Reedy	Protoform	Jaco/Jaco	Paragon	21/115
10	10 ...Craig Drescher	Assoc.	Reedy	LRP	Sanwa	Airtronics	Orion/Reedy	Assoc.	Jaco/Jaco	Paragon	23/120



break the needle off a decibel meter. The last minute of this race was by far the most exciting racing action I have ever witnessed in my 11 years of dedication to R/C racing. Swauger and Hirosaka battled it out like the combatants in one of the closing fight scenes from a "Rocky" movie; I mean, these guys were really sparring! Masami Hirosaka managed to hold his ground and crossed the line to take first, 100 points and the 1/12-Scale World Championship. Mike Swauger crossed a fraction of a second later in second, and Craig Drescher rolled in to take third.

**Round 3.** Masami Hirosaka had already claimed the world championship, so he sat out this round to let the others compete for second and third. Barry Baker took the lead, while Mike Swauger and Craig Drescher followed. Brian Kinwald had problems early and was forced out of the race during the first lap. The order remained the same for most of the race, but Swauger began to put the pressure on Baker as the master clock began to count down the last minute.

With the last few seconds counting down, while going through the chicane section, Swauger made a clean pass on Baker and claimed the lead. Baker wasn't about to let Swauger get away with that, and made a bold pass on him moments later. Unfortunately, the last pass met with great controversy, and many feel that Baker could have driven a little more conservatively, but hey, this is the Worlds! Needless to say, Baker crossed the line first and claimed 100 points, Craig Drescher second (99 points), and Mike Swauger's third (98 points).

When the points were tallied, Masami Hirosaka had 200 and the world championship. Barry Baker ended up with 199 for second. Mike Swauger and Craig Drescher ended up tied at 197, but Swauger had a better throwout round and clinched third.

#### 1/10-SCALE

• **Qualifying.** Team Associated's Mike Swauger was clearly the class of the field. Based on his performance, I could tell that nobody would be faster. In fact, his 11/4:03.10 time in the first round set the TQ pace and was never challenged. Swauger is a avid on-road gas racer with many championships under his belt, but no one could have guessed that he would be able to make the transition from gas to electric with such great success. Then again, when you have the legendary Ron Paris of Paris Racing as a mechanic, anything can happen.

(Continued on page 169)

1. Great Britain's Craig Drescher checks out Team Trinity driver Greg Hodapp's new Switchblade 10 car. 2. World champion Mike Swauger sauced his tires before one of the Qualifiers. 3. Mike Reedy from Reedy Modifieds and his protégé, Daren Westman. 4. Team Associated's Cliff Lett looks a little perplexed. I don't know why; it seemed that the Associated guys couldn't make a mistake even if they tried! 5 & 6. Pro-Line and Novak took their employees on a little "field trip" to the IFMAR World Championships. Cool; no work, free lunch and a bus ride to one of the hottest R/C events in the world! 7. Three-time IFMAR World Champion Tony Neisinger is by far one of the most laid-back racers I have ever had the pleasure of knowing. I'm sure anyone who knows him would agree. 8. Barry Baker talks amps and volts with Team Orion owner Philippe Neidhart. Orion Batteries were used to capture the 1/10-Scale World Championship.

## Traction Talk



At world-class events such as the IFMAR World Championships, new equipment is usually introduced, and it might not be available to regular racers. New tire compounds are tested, and if they perform well at the Worlds, they usually become hot sellers shortly thereafter.

But at the '96/97 IFMAR Worlds, the most popular tires were not some new, exotic compound that was available only to factory drivers. In fact, all 10 of the 1/12-Scale A-Main finalists used Jaco\* Purple rear and Pink front tires. In the 1/10-Scale category, nine out of 10 drivers also used Jaco tires, but the compounds varied from one driver to another. And if you're wondering: yes, these are the tires that you can pick up at your local hobby shop.

As you probably know, on-road drivers always use some sort of traction additive on their foam tires. There are many brands available, and some drivers even mix up their own secret sauce, which usually consists of some combination of Coppertone suntan lotion and Wintergreen oil. By far the most popular brand of traction compound at the Worlds was Paragon's\* Ground Effects.

Over 90 percent of the A-Main finalists used it on their tires. The 1/12- and 1/10-Scale world champions used Jaco tires with Paragon Ground Effects traction compound. Congratulations Jaco and Paragon!

Track surface temperature played an important role in tire performance. When the first Qualifiers were run in the morning, the track surface's temperature was already more than 90 degrees. By midday, the surface temperature increased to about 120 degrees, and it soared to 140 degrees by early afternoon. Consequently, the best lap times were recorded earlier in the day while the track was still relatively cool. For this reason, both the 1/12 and 1/10-Scale TQ's were set early in the morning, and by midday, the best track times were nearly 2 seconds off the TQ pace. To keep things fair, the qualifying order was shuffled so every driver had to face the same conditions. In other words, every driver had the same number of morning, midday and afternoon qualifiers.







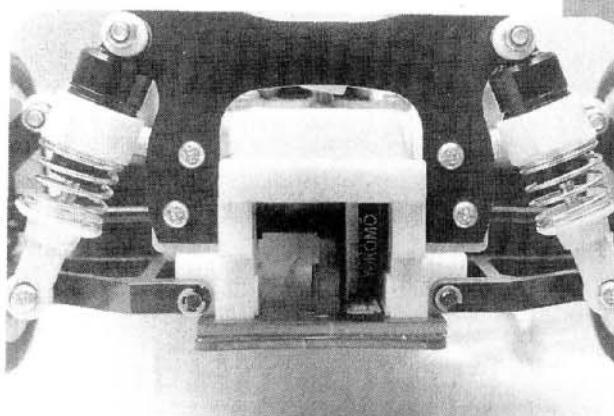
# 15 tips to improve your

Here are some 4WD sedan tips I've picked up along the way:

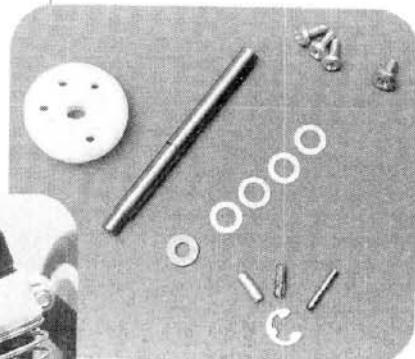
**1 Solve the debris problem.** If you race a Yokomo\* YR-4 chassis, small rocks or debris caught under the rear belt pulley inside the diff housing can stop you dead in your tracks. When this happens, the pulley locks up, the belt breaks or pops off the guides and your heat is finished. Game over. I've found a couple of ways to solve this problem: I've cut small rectangular holes in the bottom of my YR-4 under the pulleys so that any debris can fall out of the diff housing, and this works fairly well. The best way to eliminate the problem, however, seems to be to use these new yellow, nylon, open-ended diff housings made in Japan by Gutsman\*.

They're imported by Ultimate Hobbies\* in Anaheim, CA, and they're worth every penny of the \$50 or so they'll cost you. That's not cheap, but it's less than the cost of a couple of new belts and pulleys. You'll have to decide how much it's worth to make sure you finish your race. These housings even come with

3mm brass inserts for mounting the shock towers, so you don't have to worry about stripping out threaded nylon. I haven't lunched a belt since I installed mine!



**2 One-way bearings.** Some YR-4 racers like the feel of the stock, direct-drive main spur system, especially on shorter tracks. With this, they get the 4W braking effect when they let up on the gas entering tight corners. The one-way bearings in most drive systems prevent this from happening and allow only the rear wheels to feel the effect of the brakes.



The YR-4 kit comes with a standard direct-drive center pulley, if you use the pulley, you're stuck with the molded-in 81-tooth spur gear. This simple and inexpensive direct-drive spur gear adapter (part no. 6195) from Factory Works\* eliminates the troublesome one-way bearings and also allows you to use any spur gear you want up to an 81-tooth, 48-pitch size or a 108-tooth, 64-pitch size. You'll have to buy a Yokomo (ZC-630) center pulley to make it all work, but the bag contains everything else except the spur gear of your choice. Cool!

**I**'VE HAD THE good fortune to hook up with the folks at Hobby Works in Laurel, MD, and I've raced with a lot of other locals in some of their Sunday parking-lot events. These events are very well-attended, with a typical crowd of 40 or 50 racers gathered on a Sunday afternoon for fun, bench racing and competition. The drivers run the gamut—from wide-eyed newcomers to grizzled veterans—and, I must say, I've managed to pick up a tip or two from most of them.

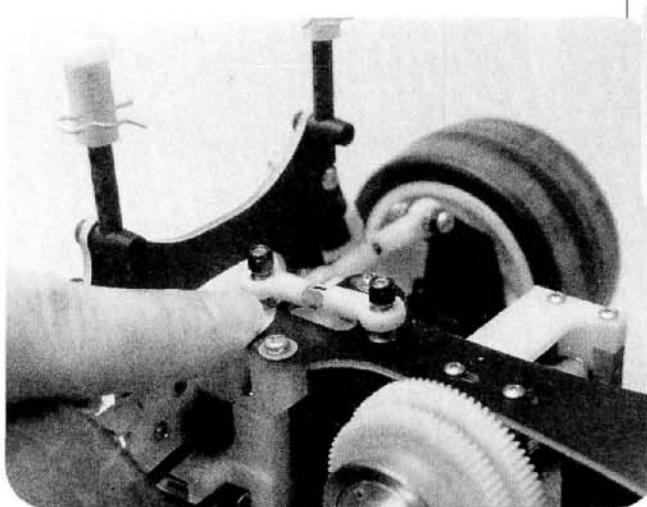
Stock sedan racing is one of the most popular classes at these races, and it's easy to figure out why: the rules are very simple; the cars are durable and realistic; and this keeps everybody at just about the same performance level. You need driving skills and strategy to do well at spec-class events; more than one Main has been won by a patient jockey who started in the middle of the field. These guys know you have to finish the race to finish in the lead, and they make sure they're always running when the final tone sounds.

# 3rd Car Tips

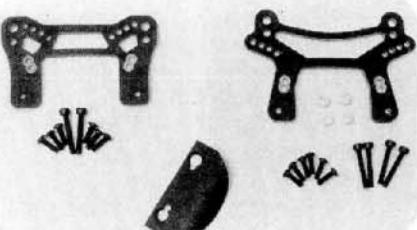
## *sedan performance*

by Doug Mertes

**3 Rear-end linkage.** This part comes right off the Yokomo Works '93 off-road car. The first time I saw it, I thought it was overkill, but a racer in California convinced me that it strengthens the joint between the upper chassis stiffener and the rear diff cover. This prevents the rear belt from jumping off the pulley when you hit a major pothole or a corner dot while powering out of a corner. Use a pair of Associated\* shock-mounting ball links and a very short 4-40 turnbuckle. The upper camber link from an Associated 10L will work, but you could also just cut down a stiff, high-quality turnbuckle link. Mount the forward ball link in the hole that's already drilled in the upper brace. Use a Dremel\* tool to shorten the knob that protrudes from the nylon rear diff housing cover—the knob that fits into the rear slot in the upper brace. To provide clearance for the linkage, drill a small hole in the cover and run a 4-40 or 3mm screw up through the bottom and through the other end of the link. Fasten both ends with locknuts of the appropriate size; you may have to play around with the length of the hardware to get everything just right. You want the linkage to act as a brace of the proper length (hence the turnbuckle) when the rear belt tension has been set according to the directions in the assembly manual.



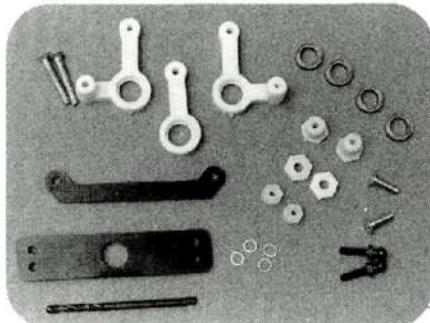
**4 Change the shock towers.** These Factory Works shock towers (front, 2030; rear, 2031) have several advantages. Their multiple upper-camber-link



holes allow the driver to compensate for differing track conditions (the upper mounting holes cause less camber change when the suspension is compressed). There are also four upper-shock mounting holes, which vary the leverage applied to the shock by the suspension arm. They're made of G-10 fiberglass, instead of graphite; so they'll bend—but not shatter—in an accident. This is good, basic suspension-tuning stuff that should be combined with a small, thin Factory Works Kydex front bumper (6191) for reduced front-end weight.

## 15 TOURING CAR TIPS

**5 Smoother steering.** This Factory Works ball-bearing steering kit (6185) should look familiar to anyone who has hung around the off-road scene. It uses the same steering arms as Factory Works has sold for years for the RC10. In this application, the steering servo is mounted lengthwise on the chassis for ideal weight balance using hardware designed specifically for the Yokomo YR-4.



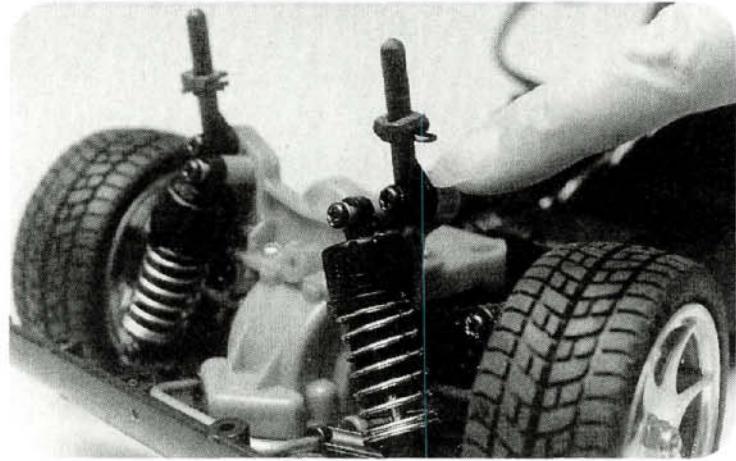
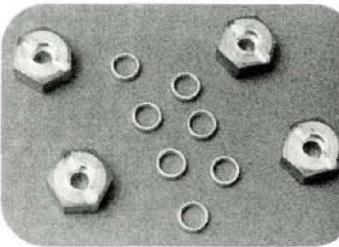
This smooth, slop-free linkage makes a world of difference to the precision of your steering, especially when it's used with the included ball bearings.

### 7 Breakage equals buckage.

If you race Tamiya 4WD sedan cars on a regular basis as I do, you discover their weak spots pretty quickly. I broke three (count 'em!) front shock towers in two weeks before I discovered how to avoid doing it. By adding spacers to the two already under the shock piston inside the shock bodies, I reduced the ride height on my sedan and eliminated all but about 15mm of shock travel. The car handled great, but as soon as I whacked something, the front shock tower broke right where the shock was screwed into it. I removed the additional spacers and went back to the two (one thick, one thin) the manual recommended. Bingo—no more shock-tower breakage! Apparently, the stock shock tower just isn't strong enough to take the impact of a direct hit when the car is lowered.

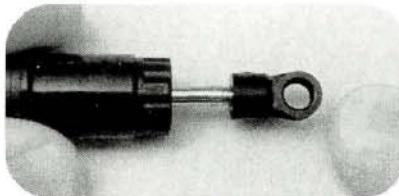
### 6 Wheel adapters.

With Tamiya-sized hex wheel adapters, you can mount Tamiya\* or HPI\* wheels on your Yokomo. That's a good thing because there are more hex-drive wheels available than pin-drive wheels. Unlike stock Tamiya parts, however, these Factory Works parts (6190) are sized to fit the Yokomo drive shafts precisely and will eliminate slop and vibration. They come with eight spacers, and for maximum performance, four of them squarely align the inner races of all of the wheel bearings. The other four are replacements for the brass bushing that resides under the axle drive pin and can be distorted so easily. I also use their similar True Spin kit (9612) on my own Losi\* Double-XT. It helps the bearings last longer and run more true, and the rear drive pins won't bend and lose contact with the drive sockets in the wheels. This is power-enhancing preventive maintenance stuff that will make your parts last longer!



### 8 Too tight means too loose.

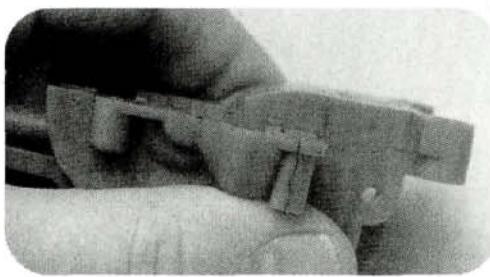
In the beginning, I seemed to go through a lot of lower shock mounting eyes (or rod ends). These are screwed onto the lower end of the shock shaft. Mine always wound up stripped, usually



after just a few heats. This one really had me stumped—until an 11-year-old told me that I was probably just tightening them down too much. He suggested that I thread them on until they just bottom out. It worked! I haven't stripped out one of these in months.

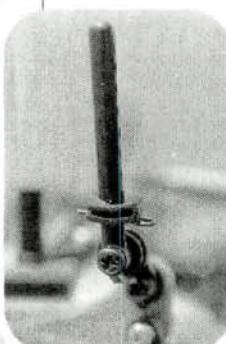
### 9 I'll tighten this one just a little more...

Almost every 4WD car I checked out on a recent afternoon had one of these: a broken screw boss on the transmission housing cover. It seems that the material that surrounds the shaft is thin and highly stressed; it's one place where owners can really get a good crank on old Mr. Screwdriver. Don't do it! This is where you need to screw in the self-tapping screw until it just bottoms out, and no more! I suspect that in the heat of battle, this area gets twisted by torsional forces as the car corners and accelerates. I don't have any bright ideas for fixes; I just replaced mine and kept the old case for an emergency spare.



### 10 Little doodads.

To prevent your body from getting damaged by the lower height-setting body pins, use the little rubber doodads from the servo mounting kits that come with radios and servos. You'll also find that the body is held on a little more tightly, and it won't rattle and vibrate as much.



To keep the body height where you want it, you may have to drop the lower pin by one hole. The hole in the doodad seems too small for the body post, but the rubber stretches enough to let you slide it down the post. The doodads don't get lost, either.

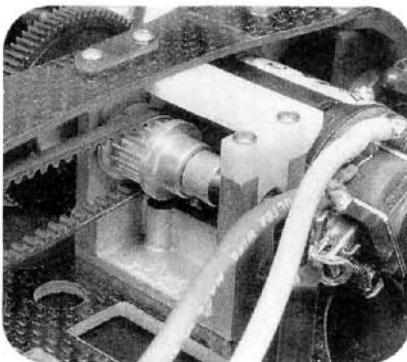
## 11 Gluing tires.

Make sure you remove the chrome plating from plastic rims before you glue tires to them. If you don't, the tires will rip right off the rim in the middle of a turn when you least expect it. The glue sticks to the plating just fine, but the plating can't stick to the underlying plastic well enough to keep the tire on. To remove the plating, use either the narrow edge of a file, or a sanding drum or cutting disk mounted on a Dremel tool set at low speed. As long as you're gluing things to wheel rims, you should also glue your foam tire liner to the inside of the tire before mounting the tire on the rim. I put a swipe of rubber contact cement on the inside of the tire before I insert the liner. That stops it from bunching up inside the tire and making your car bump up and down through the turns. Your tires will also wear more evenly and last much, much longer. Don't have tire liners? Try the new Kawada dense foam liners (TU-05) imported and sold by Ultimate Hobbies. They're the perfect length to fit inside today's latest low profile tires, and they add a little more support to the tread than most foams.



## 14 But that's not all.

When I installed the new Gutsman diff housings on my YR-4, I also took an evening to make sure that the belts and pulleys were lined up and tracking properly. There's a lot of room for error in this area of the drive train and a little attention here can reduce friction, especially if the rear belt on your car is rubbing the inside of the diff housing where it passes over the rear diff pulley. I used some thin rear-axle washers to set the spacing on mine perfectly, but I also wanted to make sure that the belt would not wander under high rpm. I went to the local hardware store and fished through their selection of nylon washers. I found some that had about the same outer diameter as the larger rim of the rear pulley but were large enough on the inside not to interfere with the diff action. I used CA to glue this washer to the outside of the diff assembly—on the side without a rim guide—and let it cure overnight before putting the whole tranny back together. Now, if the belt starts to walk off the pulley, this washer prevents it from coming off and rubbing against the diff housing. Simple, effective and cheap (my three favorite words!).



## 12 Wide body solution.

Does your club let you run bodies other than the ones made by Tamiya? If they do, you're in luck! HPI sells a beautiful Opel Calibra coupe body that fits over any combination of rims and tires that you can possibly come up with—and still keeps the tires within the wheel wells. If you run a TA02 or TA02W chassis with wide rims and wide radials, this is a great body to use, especially if you're used to seeing a field of identical Nissan 300ZX cars. I've decorated this one with some of HPI's neat new fluorescent decal sets. This body also works really well with the newly available medium-length Yokomo suspension arms for the YR-4; it's narrower than a wide body, but wider than a standard sedan body. The body's wheelbase is about  $\frac{3}{8}$  inch longer than the wheelbase of a TA-02 car, but it doesn't look too strange; the rear wheels just sit a little farther forward in the wheel wells on the body.

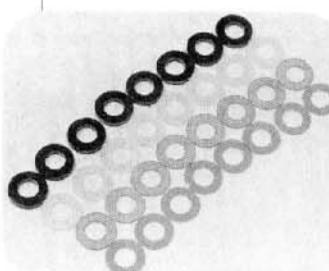
## 13 Can't afford a full-sized Mercedes?

For those of us who run plain old Tamiya TA01 or TA02 chassis with standard width rims, Elite (imported into the U.S. by Ultimate Hobbies) now sells a beautiful Mercedes-Benz Evolution body that has a lot of sharp detail but costs much less than the similar body from Tamiya. You don't get a decal or detail sheet, and it doesn't come with mirrors or a chrome-plated grill, but it's a great replacement body for racing. This one is done up in Mild Seven colors. Unfortunately, the light blue came out too dark, and the dark blue too light. It's sharp looking, but for \$20 or so, I wouldn't hesitate to put it on the track!



## 15 Stop the slop.

Are your suspension arms starting to develop slop? Here's a quick fix for you. Kose\* sells this handy little 3mm (ID) shim kit (K-1604) that comes with four sizes of plastic shims (0.1 mm, 0.35 mm, 0.5 mm and 1.0 mm). Just slip one or two, (or as many as it takes) onto your touring car's suspension-arm hinge pins and voilà: the slop is gone!



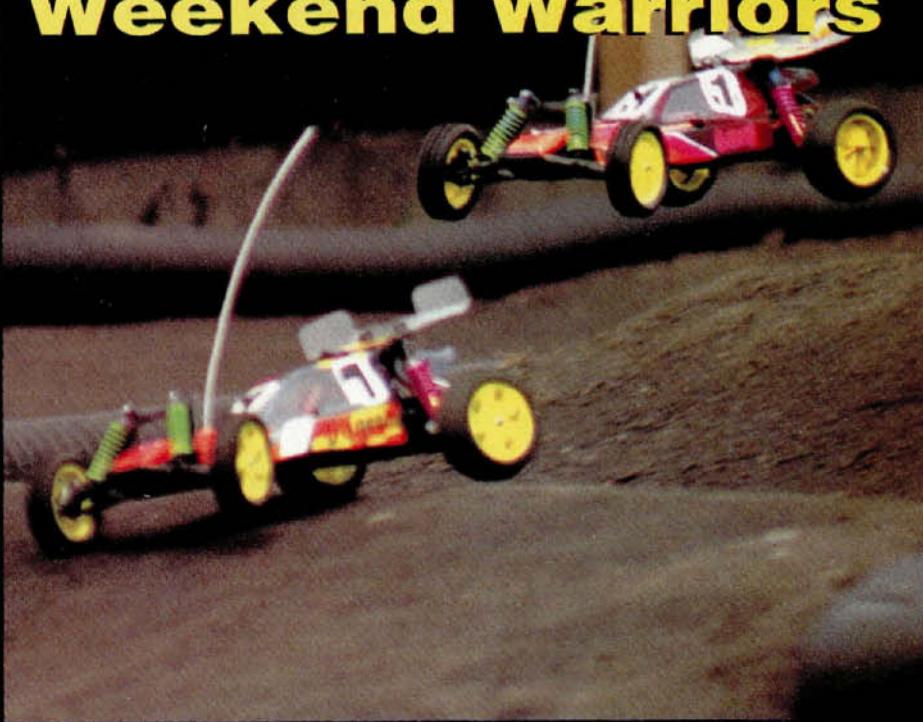
\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.



Racers ready themselves to hit the track in search of the elusive TQ position.

PHOTO BY JACK JOHNSON

## Battle of the Weekend Warriors



# STOCK NATIONALS

by Jack Johnson

**A** FEW years ago, ROAR split the off-road nationals into two separate events. This was done to keep the factory-sponsored drivers out of the stock class and give the newcomers and privateer drivers a place to race. It makes for much closer, more exciting racing in the stock classes. In my opinion, the A-Mains at a stock nationals are often more exciting to watch than an A-Main full of factory drivers at a modified nationals. There are also Junior (15 and under) and Masters (over 40) classes, which are unique to this event and make the program even more enjoyable.

ROAR



## ROAR STOCK NATIONALS

# Winners



**2WD**

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires(F/R)	Traction Additive	Pinion/Spur
1	2	Eric Pesto	Losi	Handout	Orion	Tekin	KO Propo	Losi	Losi/Losi	None	23/84
2	4	Chad Lundahl	Losi	Handout	B and T	Tekin	KO Propo	Losi	Pro-Line/Losi	None	21/84
3	1	Richie Parkhurst	Losi	Handout	Zig Batts	Novak	JR	Jammin	Losi/Losi	None	23/84
4	3	Charlie Perez	Assoc.	Handout	World Class	Novak	Airtronics	Assoc.	Pro-Line/Pro-Line	None	22/81
5	7	Jeff Hyatt	Losi	Handout	Orion	LRP	Airtronics	Losi	Losi/Losi	None	23/84

**Truck**

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires(F/R)	Traction Additive	Pinion/Spur
1	1	Chad Lundahl	Losi	Handout	B and T	Tekin	KO Propo	Losi	Losi/Losi	None	19/88
2	3	Richie Parkhurst	Losi	Handout	Zig Batts	Novak	JR	Losi	Losi/Losi	None	21/88
3	4	Dustin Brewer	Assoc.	Handout	Badd Boyz	Tekin	Airtronics	Assoc.	Pro-Line/Losi	TQ8	22/87
4	5	Charlie Perez	Assoc.	Handout	World Class	Novak	Airtronics	Assoc.	Pro-Line/Pro-Line	None	19/87
5	9	Kraig Krueger	Assoc.	Handout	Orion	Tekin	JR	Assoc.	Pro-Line/Pro-Line	Assoc.	20/87

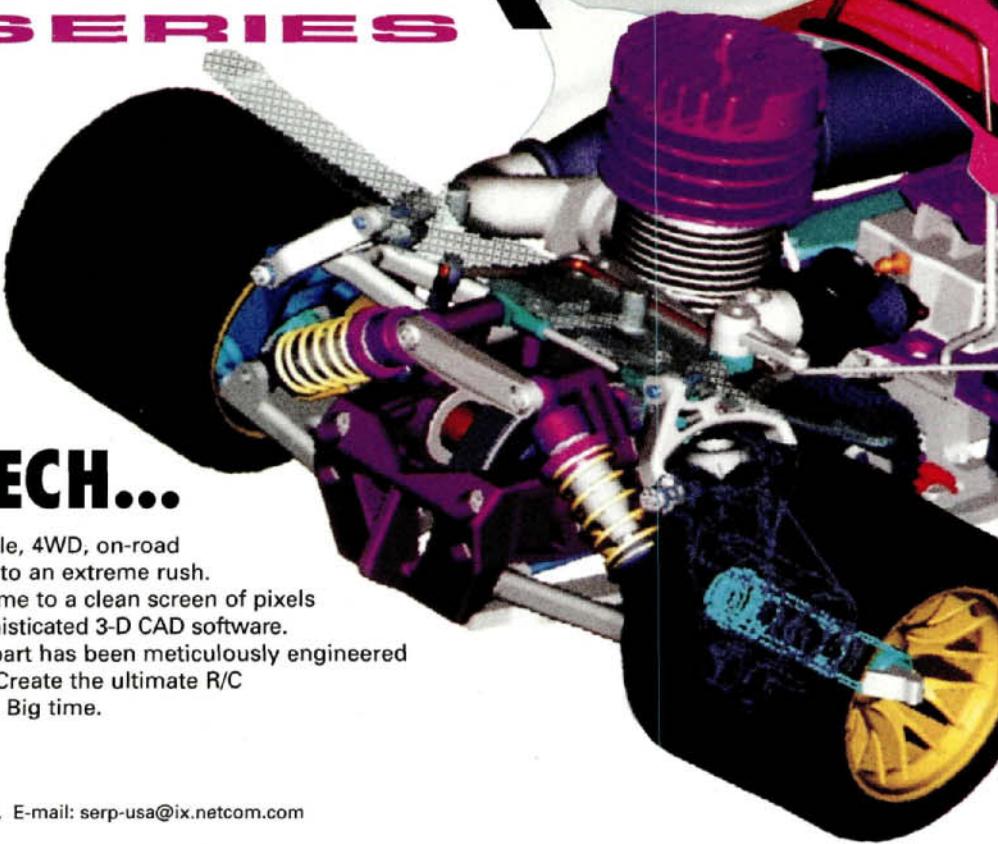
**4WD**

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires(F/R)	Traction Additive	Pinion/Spur
1	1	Brian Gisi	Tenth Tech	Handout	World Class	LRP	Airtronics	Tenth Tech	Losi/Losi	None	23/77
2	2	Kenny Nelson	Schumacher	Handout	Zig Batts	Tekin	Airtronics	Schumacher	Losi/Losi	None	19/89
3	3	Andy Zakis Jr.	Yokomo	Handout	Tech Products	Tekin	Airtronics	Yokomo	Losi/Losi	Trinity	20/87
4	6	Bob Stormer	Schumacher	Handout	ESP	Novak	Futaba	Schumacher	Pro-Line/Pro-Line	None	25/90
5	4	Curt Norbeim	Tenth Tech	Handout	World Class	LRP	KO Propo	Tenth Tech	Pro-Line/Losi	None	22/70

# VECTOR V-SERIES

## EXTREME TECH...

Introducing the VECTOR - A 1/8 scale, 4WD, on-road gas racer that turns extreme tech into an extreme rush. We brought twenty years of track time to a clean screen of pixels and designed it using the most sophisticated 3-D CAD software. Every action, every contour, every part has been meticulously engineered and tested with one goal in mind - Create the ultimate R/C gas racing machine. Well, we did it. Big time.



**SERPENT USA, Inc.**

Phone: (305) 639-9665, Fax: (305) 639 9658, E-mail: serp-usa@ix.netcom.com



Fin. Qual.	Driver	Age
1	Eric Willardson	13
2	Dustin Brewer	14
3	Ryan Thompson	13
4	5 Adam Zakis	15
5	Matt Zink	15
6	10 Missy Fisher	11
7	7 Andy Zakis Jr.	13
8	8 Kenny Nelson	11
9	6 Cody Campbell	13
10	9 Joe Zaier Jr.	13

Fin. Qual.	Driver	Age
1	2 Chris Perry	47
2	1 Gil Losi Sr.	56
3	3 Kirk Brawley	46
4	6 Bob Novak	56
5	7 Dennis Johnson	45
6	5 Gordon Willardson	49
7	4 Andy Zakis	43
8	8 Dave "Scooter" Evans	45
9	10 Gary Bennett	53
10	9 Donald McMillan	65



**Mark Pavidis** was on hand to give out a few pointers and help everyone get their cars dialed in. **Bob Novak** of Novak Electronics is at left.

Valley Hobbie in Fargo, ND, was the venue for this year's ROAR Stock Nationals. The facility has both an indoor and an outdoor track. The outdoor track was used for this event and the surface was to everyone's liking; it provided plenty of traction.

#### QUALIFYING HIGHLIGHTS

The first two rounds of Qualifying on Friday went off smoothly, and the competition was very close. Later that night, a heavy rainstorm hit. On Saturday, the start of the program was delayed so the track could be cleared of the standing water and rebuilt. The first few heats were a little muddy, but after about four or five, the track started to get fast.



**Valley Hobbie** owner **Craig Sturm** (left) poses with **ROAR** president **Phil Hurd**.

After a quick break between rounds, the final round of Qualifying got underway. As a result of the rainstorm and subsequent track rework, this round proved to be the "rocket round"; the TQ from every class came from here. After Qualifying had been completed, the TQ standings looked like this:

- 2WD. Richie Parkhurst (Team Losi\* Double-X)—12/4:09.23.
- Truck. Chad Lundahl (Losi Double-XT)—12/4:08.08.
- 4WD. Brian Gisi (Tenth Technology\* Predator)—12/4:13.46.
- Junior. Eric Willardson (Losi Double-X).
- Masters. Gil Losi Sr. (Losi Double-XT 'CR').



<http://www.serpent.nl>

## ...EXTREME RUSH

The VECTOR takes gas racing performance to new extremes.

Dynamic Roll-Center Stabilization suspension geometry, optimized camber and CG, ultra-efficient drive system, and progressive-bias shock action. These features and many others produce unmatched handling, tunability, and speed. In fact, the rush of your VECTOR may only be equaled by the rush of your pulse. Experience the tech. Experience the rush. Experience the VECTOR.



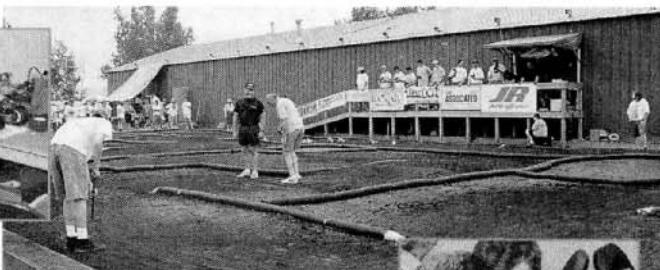
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## ROAR STOCK NATIONALS



**"Pops" Losi mediates as he prepares for his TQ run.**



**Top: the track crew makes a few last-minute adjustments before Qualifying resumes. Right: Eric Pesto readies his Double-X before going on to win the 2WD Stock class.**

### MAINS ACTION

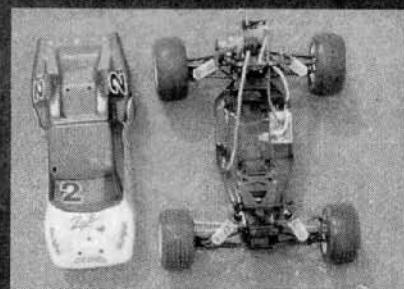
Like the ROAR Modified Nationals, the Stock Nationals use the triple A-Main format. At this level, this format can be interesting because it is not unusual for the three Mains to be won by three different drivers.

• **2WD.** In the first A-Main, Eric Pesto was out to redeem himself after having a bad fourth round of Qualifying in the Truck class and getting bumped out of the top 10. Eric went on to win the first Main, followed by Chad Lundahl and Richie Parkhurst. In the second 2WD Main, these three played musical chairs, and Parkhurst picked up the win, followed by Pesto and

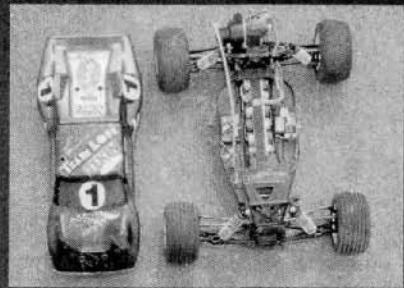
Lundahl. In the final main, Parkhurst and Lundahl swapped positions, and Pesto again finished second—giving him the overall win, with Lundahl second and Parkhurst third.

• **Truck.** Different drivers won all three Mains here also. In the first Main, the victory went to Kraig Krueger, followed by Charles Perez and Richie Parkhurst. In the second Main, TQ Chad Lundahl got the

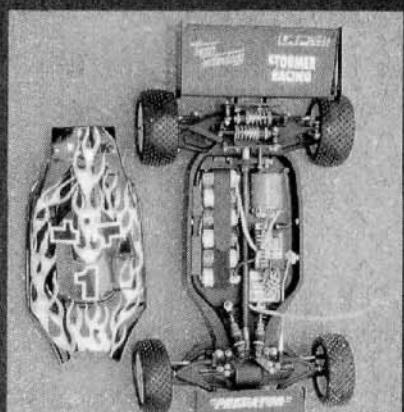
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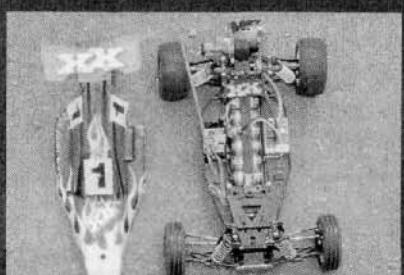
**Master's class winner Chris Perry's Team Losi Double-XT.**



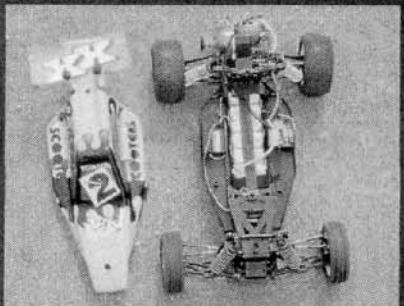
**Truck Stock winner Chad Lundahl's Team Losi Double-XT.**



**4WD winner Brian Gisi's Tenth Technology Predator.**



**Junior class winner Eric Willardson's Team Losi Double-X.**



**2WD Stock winner Eric Pesto's Team Losi Double-X.**

## Friendly Rivalry

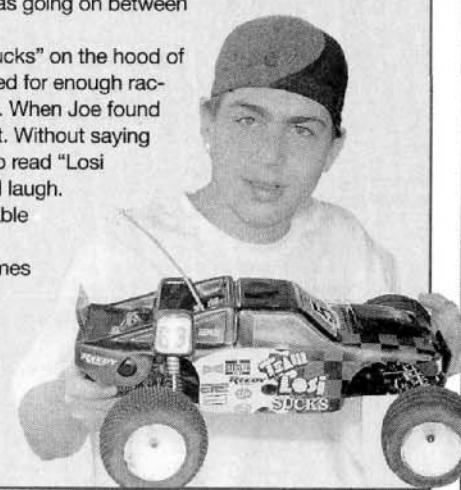
It seems that no matter where you go racing around the country you'll see the rivalry between Associated and Losi. What started as a factory-team rivalry has now trickled down to racers of all levels. Just like fans of professional sports teams, many racers are loyal fans and supporters of one of the two manufacturers. Such is the case with Joe Zaier (pictured) and Chad Lundahl.

It all started at their home track in Minnesota. One day, Chad wrote a note on the inside of Joe's truck body. It read, "Losi works better than Associated." To get back at Chad, Joe made a sticker for the outside of his vehicle that read, "Losi sucks!"

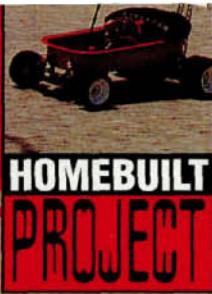
All of this took place shortly before the Stock Nationals. When Gil (Pops) Losi Sr. arrived at the Nats, the stickers were still on Joe's truck. Oblivious to the personal "grudge" between the two friends, Pops took this personally. (After all, his name is Losi so he could take it personally.) He thought that this person, for whatever reason, hated Team Losi. After checking into it a little, Pops discovered what was going on between the two and decided to have some fun.

Pops found a marker and wrote "Joe Zaier sucks" on the hood of his truck. He didn't say a word. Instead, he waited for enough racers to see it and for the news to get back to Joe. When Joe found out, he wasn't sure whether Gil was upset or not. Without saying anything, Joe changed the sticker on his truck to read "Losi rules." Pops caught wind of this and had a good laugh. After talking with Joe, Pops returned to his pit table and changed his note to read "Joe Zaier rules."

It just goes to show you that even the big names in R/C racing can have fun with the not-so-well-known racers. Contrary to what many racers think, when they travel to new tracks the factory personnel enjoy hanging out with local racers. One of the things that makes this sport so much fun is making friends all over the world.





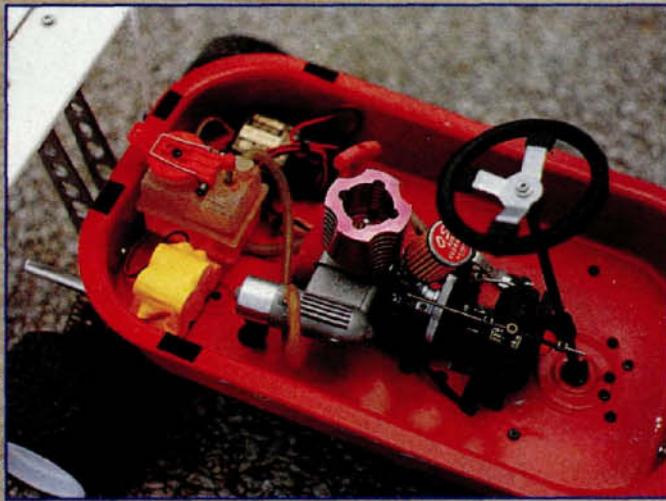


## HOMEBOUGHT PROJECT

by Dave Sproul

**I**F YOU HAVE ever been to a street-rod or hot-rod event, you have probably noticed that hot-rodders love to modify or hop up just about anything. One of the most popular ideas of the last few years is to transplant a 3- or 5-horsepower lawn-mower or go-kart engine into a plain old sidewalk wagon, add go-kart wheels and tires, a steering wheel and seat and then jump on and motor around the car show grounds. Not only does this beat walking all weekend, but you also have a really cool hot-rod wagon!

**With the seat removed, the fuel tank, receiver and receiver battery can be seen. The O.S. .12 CZ-R is stock except for the aftermarket heat sink head. A Kyosho Racing Kart steering wheel and shaft are used.**



# Little Red Racer

# Dragster Wagon

### THE TRANSFORMATION BEGINS

At a swap meet a few months back, my wife and I bought a really cute little wagon replica for five bucks. It went home with us and promptly found a place in the living room next to the fireplace, and we placed a doll in it. A couple of days later, while lounging in front of the TV, I happened to look over at the wagon and said to myself, "I think I have a set of wheels and tires that would look good on that!" Fortunately, my wife was at a meeting, so out to the workshop the wagon went. While I was looking for the Kyosho\* Sprint car wheels and tires I had in mind, I stumbled across an O.S.\* CZ-R engine with a pull-starter. "Gee, I bet that will work, too!" The next thing I knew, I was cutting off the stock replica wagon tires and handle, and the drill press was punching a bunch of new holes into that cute little wagon's metal tub!

Further searching in the parts box yielded a Kyosho Outlaw Rampage chassis and suspension that had not been used in some time. I pirated the entire front suspension and modified it to fit the front of the wagon. I rebuilt the rear gearbox with new gears, and I modified the suspension slightly. I added gold Kyosho shocks all around, and I fabricated custom braces to support the front bulkhead and rear

gearbox because they were now attached at the top to the wagon base with no chassis plate between them for support. I attached the stock Outlaw Rampage steering to the bottom of the wagon. I made a custom shaft using a rear axle and coupled it to the Kyosho Racing Kart steering wheel and shaft so that the steering wheel turns with the front wheels. I mounted the steering servo under the wagon tub.

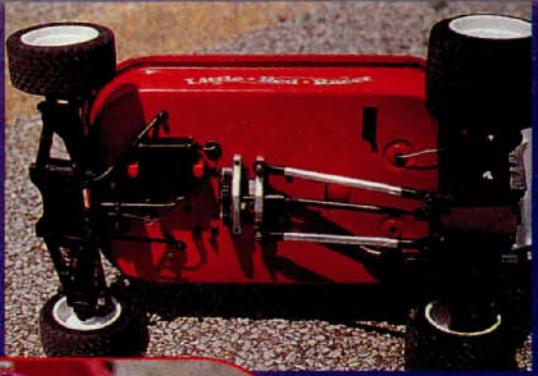
### WAGON POWER

After cutting a clearance hole for the flywheel, I mounted the CZ-R in the center of the wagon. Custom aluminum mounts hold a handmade shaft to which





**The front suspension is from a Kyosho Outlaw Rampage and has been decked out with Kyosho gold shocks.**



**Above:** This bottom view reveals the handmade aluminum pieces that support the spur gear shaft. The drive shaft is from a Kyosho Pathfinder. The rear suspension braces are made of 1/4-inch aluminum bars with Inferno ball ends.



**The rear suspension is also from the Outlaw Rampage. A molded Inferno wing is mounted on a custom aluminum wing strut. Check out the chrome tailpipe.**



## LITTLE RED RACER

a stock Kyosho spur gear is attached. Power is transferred from this shaft to the gearbox via a drive shaft originally used in Kyosho's Pathfinder 4x4. I used an O.S. muffler with a custom chrome tailpipe made from an old transmitter antenna. The throttle servo was mounted in front of the engine and also controls the stock Outlaw Rampage brake. I added an aftermarket heat-sink head for improved cooling as well as for "cool" looks.

I mounted a Kyosho 75cc fuel tank under the seat with the Futaba radio receiver on one side and DuraTrax\* 6V receiver battery pack on the other. I fabricated the seat base from  $\frac{1}{16}$ -inch plywood sheets and foam and then took it to an upholstery shop for a professionally pleated cover. I attached the seat to the wagon with Velcro®-brand fasteners for easy removal and to gain access for refueling. For out back, I fashioned a set of handmade aluminum wing mounts, and I modified and attached a Kyosho Inferno molded wing.

### DRIVING THE RACER

Handling and performance are on a par with those of a typical off-road 2WD gas



**Here's the full-scale Little Red Racer. This one you could actually ride—not on the highways, though.**

buggy or truck. The lowered suspension and wide street tires help provide the desired look and traction. The Little Red Racer is a blast to drive around at car shows. Too bad it's too small to ride on! It

really does need a "driver" aboard.

I found a really cool stuffed Wile E. Coyote, but unfortunately, he wouldn't quite fit. His leg rested right on the muffler, and I couldn't bear to see \$22 worth of toy go up in smoke, so back to the store he went. Maybe I'll find something suitable in the near future.

I hope you've enjoyed the tale of the Little Red Racer. Oh, by the way, my wife was a little upset when she came home from her meeting and found her doll on the hearth without her wagon. Fortunately for me, when she saw the wagon's transformation, she agreed that it was awesome! Still, I found myself at the local Kmart buying a new replica wagon for the doll. I guess I'll leave that one by the fireplace. I don't think I can get away with cutting up two of them!

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

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# PC/RC Gauges

## In the know about your glow

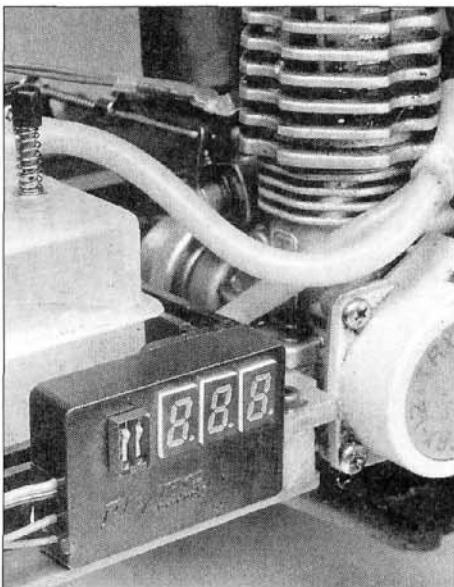
by Greg Vogel

**I**S YOUR GLOW engine running too hot, or is it too cool? Is your engine reaching its highest possible rpm? These are critical questions, whether you compete or just fool around in your backyard. Your engine's temperature indicates not only how well it has been tuned, but also how well it will perform.

Knowing your engine's rpm can also tell you about its performance potential—including whether it has been geared correctly for its application.

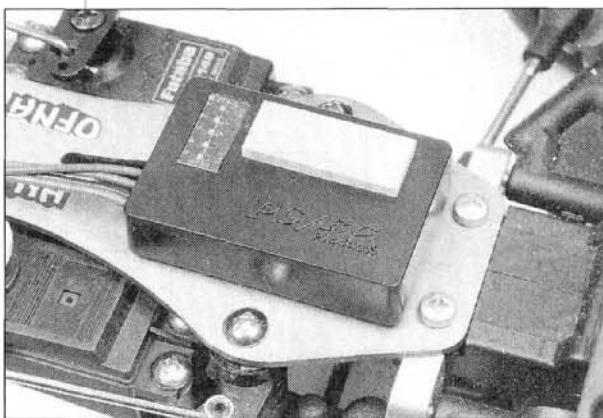
PC/RC  
Products\* has  
introduced a

line of brightly illuminated gauges that make it easy for you to assess your engine's performance.



### TEMP GRAPH

The Temp Graph does much more than use a bar graph to indicate the engine's operating temperature. When the engine is running, the gauge goes through a calibrating sequence in which all the lights are illuminated and the bar graph displays the receiver battery-pack voltage. The voltage range is displayed on the bar graph from 4.7 volts to 6.5 volts. Each lit bar represents 0.2 volt (i.e., when three



bars are illuminated, the battery level is 5.3 volts—.6 added to 4.7 equals 5.3). If the battery's voltage is less than 4.7 volts (the graph will operate with as little as 4.5 volts), the graph will flash the first red bar twice to indicate low battery voltage.

The graph can be set to display temperature in either Celsius

(orange bars) or Fahrenheit (green and red bars). The gauge has five dipswitches that can be flipped on or off to choose the temperature range and select between Fahrenheit or Celsius. I left the switches in their factory-set positions.

I installed the Temp Graph in my OFNA\* Mercedes touring car. To install the heat-sensitive probe, simply attach it to one of the

engine's cylinder-head bolts and tape the graph on a spot where nothing will rub the probe or its wires. For power, the graph is plugged into the third channel of your receiver. If your receiver doesn't have a third channel, you'll need a Y-harness.

After running my car, I pulled over and found that the bars on the gauge were blinking red, which

meant that the engine was running *really* hot. I removed the glow plug; it was black—very bad. I let the engine cool and then adjusted it so it would run richer and cooler. A few laps later, my engine was running at a safe temperature and was still fast.

### DIGI-TEMP

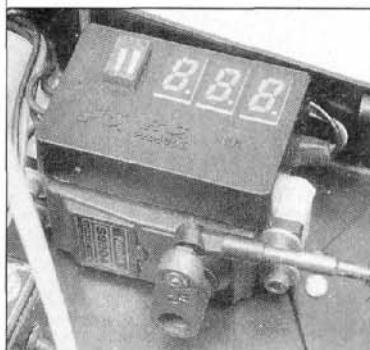
So, you want to know the exact temperature of your engine? The Digi-Temp is similar to the Temp Graph but it provides a numerical temperature reading instead of a bar graph. The Digi-Temp has two switches that control its functions. The Digi-Temp performs the same functions as the Temp Graph, and it also records the highest temperature reached during a single run. You can also set it to show the engine's current running temperature.

I popped the Digi-Temp into a different gas car for testing. When set in the "run" mode, it gave me a consistently accurate reading of head temperature. Next, I set the gauge to record the highest overall head temperature. It did that, and as the temperature rose, it displayed the highest temp reading.

## PC/RC GAUGES

### DIGI-TACH

The Digi-Tach is the most advanced instrument of the bunch. It's an onboard tachometer powered by your car's receiver battery pack. Attach its magnetic probe to the engine's backplate to read rpm (from 1,500 to 55,000) from the engine's crankshaft.



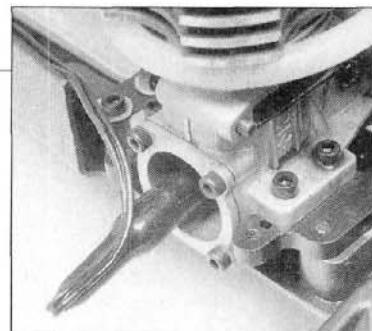
When the gauge is turned on, it displays "PC rc" then flashes "r" if it has been set for continuous readings, or "H" if set to hold the highest recorded rpm. The modes are selected using

I mounted the Digi-Tach on the steering servo of my Team Associated\* RC10GT, and used CA to glue the magnetic probe to the backplate of my O.S.\* CZ-Z engine. CA holds the probe well, but it can be pried off with a screwdriver. When the crankshaft turns over the magnetic probe picks up and reads the shaft's metal crankpin's revolutions.

dipswitches.

With the engine running, the Digi-Tach's reading rose until the engine reached idle speed. My engine idled perfectly at 9,000rpm. I picked up the back end of the car off the ground and yanked the throttle. With the engine running rich, the display read 30,000rpm—not bad for a little .12.

With the Digi-Tach, you can determine the point at which the engine revs too high (this could cause excessive wear or even engine seizing). A sudden decrease in engine's rpm could indicate worn parts that need to be replaced. The Digi-Tach can be used to find the best idle point; when you know that, you can always set your engine to idle perfectly. In its hold mode, the Digi-Tach can also be useful to select the right gear ratio. The only problem I can see with the Digi-Tach is that it can't be used with pull-start engines because there's no access to the engine's backplate.



### WHICH ONE SHOULD YOU BUY?

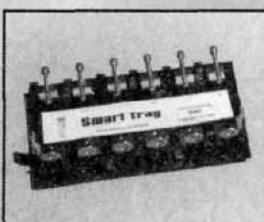
Faced with three function-packed gauges, choosing just one can be hard. Your decision should be based on need. If you suspect that your engine is overheating, choose the Temp Graph or the Digi-Temp. If finding the exact temperature is crucial, you may lean more toward the latter,

because it will give that reading. If you can distinguish between the bars on the Temp Graph, this might be a better option because it also reads receiver-pack voltage.

The Digi-Tach can be used by enthusiasts and advanced racers. The Digi-Tach displays engine rpm, and this can help

you determine proper gearing and when maintenance is required. No matter which gauge you choose, remember that all will help you get the maximum performance from your engine.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■



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## IFMAR WORLD CHAMPIONSHIPS

(Continued from page 97)

Team Associated's Josh Cyril (driving a narrower RC10LS prototype), Barry Baker (driving a Yokomo YRX-10 prototype with a very unconventional battery-mounting configuration), Masami Hirosaka (also driving Yokomo YRX-10 prototype) and Team Trinity driver Joel Johnson (driving Trinity's Switchblade 10 prototype) all gave fantastic performances and definitely had what it took to win the world championship. David Spashett, Tony Neisinger, Sakke Ahiniemi, Mike Lufaso and Craig Drescher also ran clean races and qualified for the A-Main.

**• A-Main: Round 1.** Mike Swauger got the holeshot and stormed out in front with Josh Cyril, Masami Hirosaka, Joel Johnson and David Spashett following closely. At the 2-minute mark, Swauger already had a commanding lead, but Hirosaka started to make a move on Cyril, who was sitting comfortably in second. At the halfway point, Swauger was way out in front, while Hirosaka continued to look for the opportunity to overtake the second-place Cyril.

During the last minute, things started to get pretty mixed up as several position changes took place. Johnson began to pressure Hirosaka for third, while Hirosaka pressured Cyril for second. Swauger continued to run away with the race.

The end-of-race tone sounded, and the scramble for the finish line began. Johnson made a move on Hirosaka and momentarily managed to get in front, but Masami came right back with an aggressive move and punted Johnson's car in the process. This gave Spashett the opportunity to squeeze by to take second. When the dust had settled, it was Mike Swauger in first, David Spashett second and Joel Johnson third.

**Round 2.** Mike Swauger once again used his choice placement on the grid to his advantage and shot out in front with Josh Cyril, Barry Baker and Masami Hirosaka in tow. On the second lap, a collision going through the short shoot claimed Joel Johnson's car. Craig Drescher, who was also involved in the collision, managed to escape without any damage. With 3 minutes down, there was no doubt that Mike Swauger would emerge victorious because he enjoyed a 4-second lead on his nearest competitor. Meanwhile, a serious battle was taking place for third between Baker and Hirosaka and it looked as though Josh Cyril had second locked up.

As it turned out, Mike Swauger held the lead and finished first, and that earned him his first IFMAR World Championship. Josh Cyril held on to second. Masami Hirosaka rolled in to take third, but a 3-second penalty for corner cutting bumped him to sixth overall. This moved Barry Baker to third, even though he had crossed the line fourth.

**Round 3.** This time, it was Mike Swauger who sat out the third and final Main

because his name was already engraved on the first-place trophy. At this point, second and third were undecided and many racers still had a chance at IFMAR glory. It was Barry Baker who led the pack around the first lap, while Joel Johnson and Josh Cyril followed at an aggressive pace. On the second lap, Masami Hirosaka plowed into a chicane and this sent him back to the flanking position. At around the 2-minute mark, Johnson got the opportunity he was waiting for and passed Baker to take the lead. This was the only time that Johnson had a clear view of the track in front of him during the entire event.

With 3 minutes down, Baker started to pressure Johnson, but Johnson held on tightly to his position. The announcer made a remark over the loudspeaker that Joel Johnson was used to the pressure, but Barry Baker was not, which I thought was a little uncalled for because Baker was on the drivers' stand racing his guts out, and a comment like that might either break his concentration or make him go after Johnson with a vengeance. Meanwhile, Josh Cyril was getting closer and closer to the leaders and was looking for that opportunity to knock on their doors. Unfortunately, opportunity didn't knock (or even chime, for that matter); moments later Cyril pegged a washboard just as he was getting ready to plot his assault on Baker. Baker, on the other hand, took the tight line going into the Baldwin Curl and overtook Johnson for the lead. Johnson came back strong, but the race ended before he had the chance to launch a comeback. Baker crossed the line first. (I'm sure the announcer needed help removing the shoe from his mouth when the race was over!) Johnson rolled in 0.4 second later in second. Josh Cyril crossed in third, less than a second behind Johnson.

When the points were tallied, Mike Swauger was the obvious champion with 200. Barry Baker came in second with 198 and Josh Cyril third with 197.

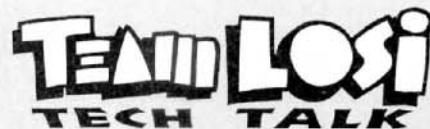
### WRAPPING IT UP

The '96/'97 IFMAR 1/12- and 1/10-Scale Electric On-Road World Championships was a fabulous R/C racing event. At first, although Revelation Raceway had a little trouble coping with the pressures of hosting a World Championship event, the race went rather smoothly. The weather was awesome, the people were great, and the racing action was the best. What more could you ask for?

We at *R/C Car Action* congratulate Masami Hirosaka and Mike Swauger for their spectacular performances and take our hats off to the folks at Associated Electrics for winning two more world championships.

\* Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

ADVERTISEMENT



### RUMORS BECOME REALITY

A long-standing rumor that Team Losi is about to produce a 4WD car has now spread around the R/C community. Over the last four years, whenever a member of the Team Losi crew was asked about it, the response would be something to the effect of, "We've always wanted to make one, but we have several other things we would like to do before we consider manufacturing a 4WD car." Well, I suppose we just ran out of "other things" to do. At the '96 ROAR Modified Nationals, Team Losi surprised everyone when Jack Johnson began to practice with a 4WD car the likes of which no one had ever seen. It was apparent that the car was a Losi prototype—tentatively titled the XX-4.

The car's first outing proved very successful. Three prototypes entered the event. Team Losi drivers Brian Kinwald, Jon Anderson and Greg Hodapp qualified the prototypes for the A-Main. Brian took the TQ position and won the A-Main convincingly. Judging by the interest generated by this new car, it looks as if the 4WD class will be revived at last. Insiders at the Losi factory say that the XX-4 should be available some time in early '97.

### STOP STRIPPING SHOCK COLLARS

Tired of stripping the threads out of the top shock-spring collars? Here is an easy solution to the problem. Carefully enlarge the larger hole in the spring collar (the one that the screw usually passes through) until an aluminum-thread insert from the Hydra Drive will fit snugly into the hole. Replace the standard 4-40 screw with a 2-56 Hydra Drive screw. This smaller screw may now be threaded in from the side of the spring collar that has the smaller hole (the side that the 4-40 screw threaded into). You'll then be able to tighten the collar without fear of stripping out the threads.

### WHAT A DRAG!

You know those blue, foam-looking seals that fit next to the outdrive bearings in some of the Double-X transmissions? Take them out! All they do is create drag on the transmission. These seals were originally designed to be used with outdrive bearings not equipped with Teflon™ seals. Since all of the Double-X transmissions are now equipped with these Teflon-sealed bearings, the blue seals are no longer needed.

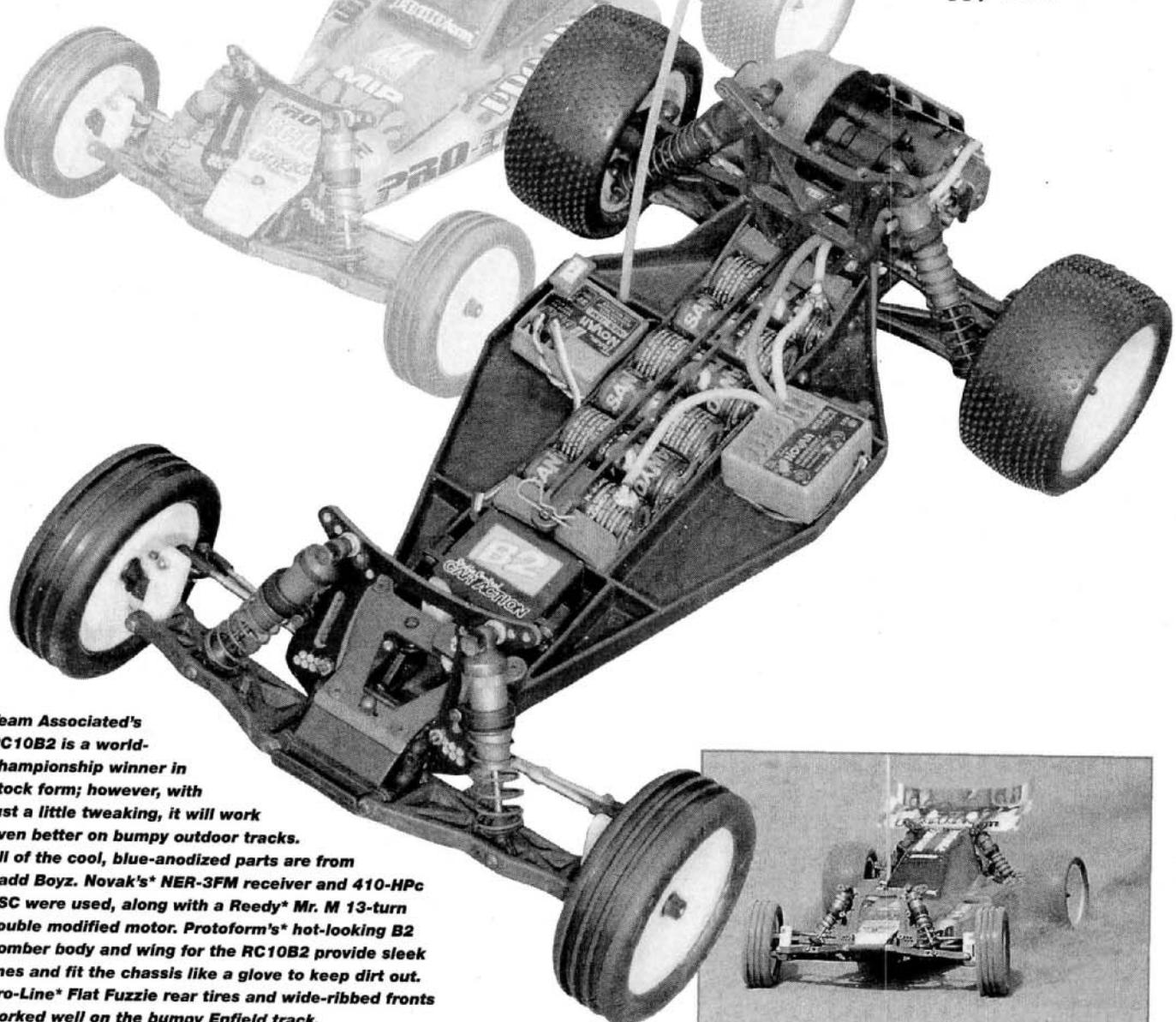
\* \* \*  
Let us know what's going on! Address your questions and problems to: Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

Tuning and modifying the

ASSOCIATED

## RC10B2

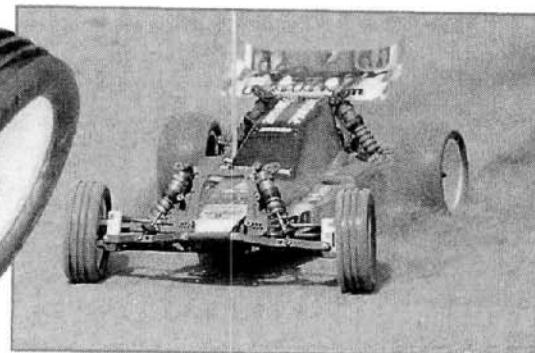
by Frank Masi



**Team Associated's RC10B2 is a world-championship winner in stock form; however, with just a little tweaking, it will work even better on bumpy outdoor tracks. All of the cool, blue-anodized parts are from Badd Boyz. Novak's\* NER-3FM receiver and 410-HPc ESC were used, along with a Reedy\* Mr. M 13-turn double modified motor. Protoform's\* hot-looking B2 Bomber body and wing for the RC10B2 provide sleek lines and fit the chassis like a glove to keep dirt out. Pro-Line\* Flat Fuzzie rear tires and wide-ribbed fronts worked well on the bumpy Enfield track.**

**H**OW DO YOU IMPROVE on a world champion? It's not easy, but since reviewing the Team Associated\* RC10B2 (May '96), I've determined that some extra tuning and tweaking are necessary to make the car really potent on the severely bumpy and rough tracks on which I usually race.

The excellent tuning supplement that comes with the B2 lists an "alternate" setup for bumpy tracks. I've tried these settings, and they do work well; however, I knew that I could make the B2 work even better through the ruts and choppy stuff.



• **Hydra Drive.** I've spent a great deal of time watching cars negotiate bumpy tracks. The biggest difference, in my opinion, between the Losi\* Double-X and the B2 is that the Losi car seems more sure-footed over moguls and sharp-edged ruts and holes. I believe that much of this advantage comes from its Hydra Drive slipper system, which allows the standard friction slipper to be set more loosely to absorb a lot of the driveline shock that can cause a car's rear tires to lose traction.

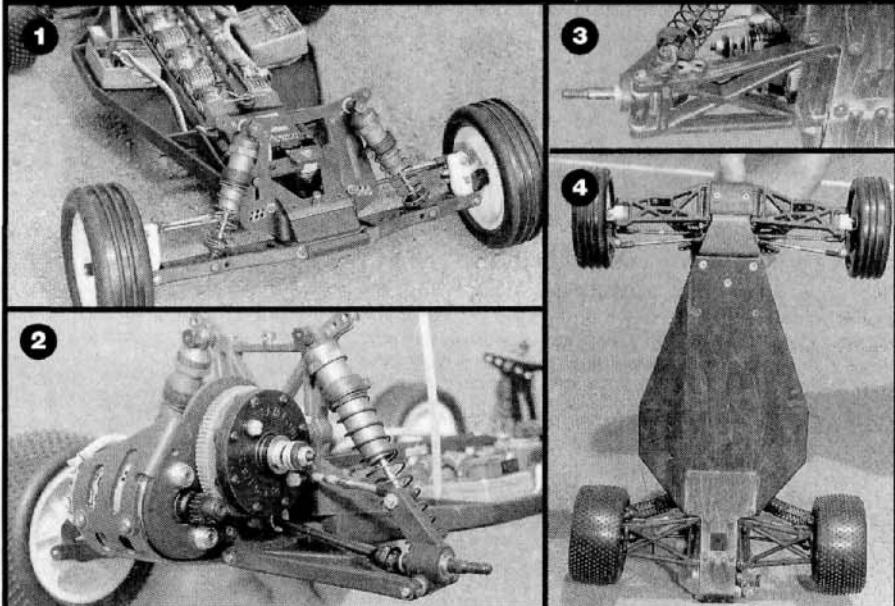
Luckily, Team Losi offers a Hydra Drive conversion kit for the B2 (or any Stealth-transmission-equipped vehicle) that's a direct bolt-on. The conversion includes everything you'll need to add the Hydra to your B2 except the gear cover (needed because of the Hydra's size), which is available from Associated.

Adding the Hydra Drive to my Stealth tranny was relatively simple, although I found that the Hydra's top shaft gear didn't mesh well with the stock Associated gears. I replaced the Stealth's idler and diff gears with new ones, and this seemed to improve the mesh with the Hydra gear. So before you convert to Hydra Drive, buy new gears.

• **Rear suspension.** At the '96 ROAR Off-Road Nats, Associated announced the release of new rear suspension arms for the B2. The arms now have a third hole farther out in which to mount the shocks. Mounting the bottoms of the shocks farther out on the suspension arms increases relative shock speed and allows you to use softer spring rates and lighter damping. Also, side-to-side stability is improved.

When using the new arms, you'll have to switch from the stock B2's 1.02-inch-long shock shafts to the 1.32-inch shafts. Also, you must add four, .031-inch-thick limiters to each shaft before installing it in the shock body. I wouldn't be surprised to see new shafts from Associated for this

1. Front end features include a trick new shock tower from Factory Works, 25-degree caster blocks, Lunsford titanium Punisher tie rods and MIP Gold shock shafts. The aluminum top plate is from Badd Boyz. 2. Team Losi's Hydra Drive traction-control system greatly improves the B2's handling on bumpy tracks. Also shown are MIP's CVD drive shafts, Lunsford's Fat Boy titanium motor screws and a Trinity\* Team Kinwald 48-pitch pinion gear. 3. Associated's new rear suspension arms for the B2 include a new, outer hole for the rear shocks. I spaced the rear hubs in the middle position, and this increases wheelbase slightly. 4. The B2's underside is smooth and sleek to minimize drag. The blue-anodized front nose plate is from Badd Boyz.



application because when fully compressed, the 1.32 shafts allow the piston to go all the way to the top of the oil and into the air space.

I installed MIP's\* Gold shock shafts (1.32 inches) and Associated's no. 1 pistons to the rear shocks and filled them with Associated 25WT silicone oil. Associated recommends their Green springs for the new arms, so that's what I installed. I attached the tops of the rear shocks in the middle position on the stock shock tower.

• **Front suspension.** Factory Works\* has just released a pair of new, fiberglass shock

towers for the B2. Both towers offer additional holes for the shocks and the camber rods; however, one tower is intended for use specifically when the shocks are mounted in the outer hole on the suspension arm while the other is for when the inner hole is used.

I decided to mount the bottoms of my front shocks in the outer holes on the suspension arms, so I used the shorter of the two Factory Works towers. I attached Associated's no. 1 pistons to a pair of MIP .71-inch-long Gold shock shafts, filled the front shocks with Associated 30WT oil and installed a pair of Green springs. I mounted the tops of the shocks in the middle holes on the new shock towers. This may make the front suspension feel too stiff to you, but just try it; you'll find the front end much less "darty" through the bumps.

I've always preferred 25 degrees of caster on the B2 (the kit comes with 30-degree blocks) because this provides more consistent steering. The 25-degree blocks don't provide as much turn-in as the 30s, but they greatly improve mid-turn steering. Although the Factory Works shock tower offers a choice of seven positions for the inner camber rod, I decided to stick with the stock position because it works well.

• **Transmission.** The B2's 2.4:1 Stealth transmission is one of the best performing and most durable gearboxes I've ever

## PARTS LIST

### MIP

- B2 CVDs—part no. 1116
- Gold shock shafts in 1.32-inch (1049) and .71-inch (1047) lengths
- Shiny Light diff outdrives—1190

### TEAM ASSOCIATED

- New rear suspension arms (no part no. available)
- Gear cover for Hydra Drive—9248

### BADD BOYZ\*\*

- Top front brace—901
- Front kick-up plate—9210
- 4 shock caps—6463
- Motor-mount plate—9245
- Rear chassis plate—9240

- Battery-hold-down strap—902
- Front arm brace—9120
- Tranny brace—903
- \*\* Aluminum parts are available in blue, purple, or green.

### TEAM LOSI

- Hydra Drive for Stealth transmission—3139

### PROTOFORM

- B2 Bomber body—1511

### LUNSFORD\*

- Punisher titanium tie rods for the B2—PS88

by Doug Mertes

# Check Camber and Toe-In

## Straighten up and drive right

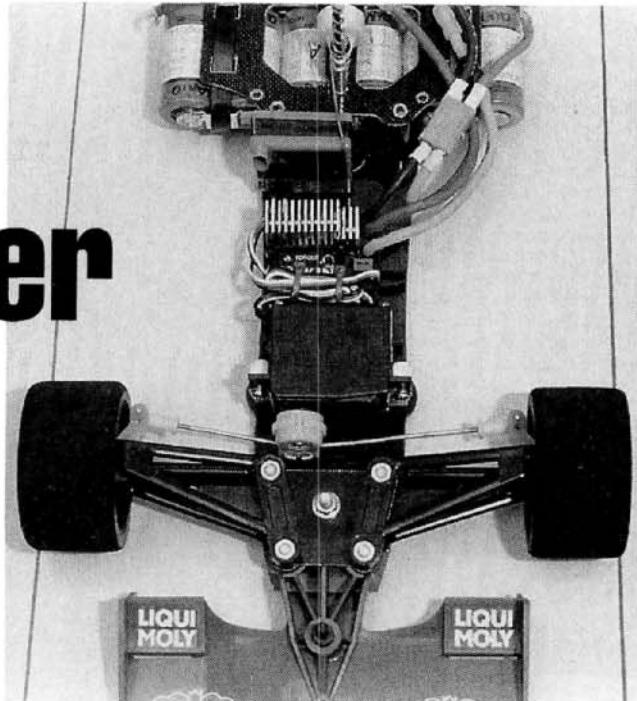
**M**ANY ENTRY LEVEL R/C kits have one thing in common—fixed-length suspension links. This means that the new driver doesn't have to measure camber angles or figure out suspension geometry to get a new car or truck to run properly right out of the box. Many cars in this category also use fixed-length steering linkage, so the front-suspension toe-in doesn't have to be set, either.

Sooner or later, however, one of two things happens: either the now not-so-new driver opts for a set of adjustable turnbuckle links, or he comes across a set of handling problems that can be cured only by altering the manufacturer's standard suspension setup.

Eventually, of course, we all wind up squatting next to our car or truck, peering at the tires, squooshing the suspension up and down and wondering what would happen if we changed the length or location of those little rod things attached to the ends of the suspension. A discussion of the results of camber change, toe-in alteration, or linkage relocation would take up more space than I've been allotted, so we'll concentrate only on how to measure the changes you'd like to make.

### CAMBER

Camber can be broadly defined as the angle at which the top of the tire leans inward (negative camber) or outward (positive) from the center of



*If you have a hard time figuring out what's really straight, try drawing a couple of parallel lines on a sheet of poster board. Some people find it easier to visualize toe settings when they have a reference point to look at.*

the car. Camber is measured in degrees from an imaginary vertical line. It can be set at both ends of cars with independent suspensions, but it can be set only at the front end of pan cars and F1 chassis. But wait a minute! Don't we always want the tire to be perpendicular to the surface it's running on? Why would we ever want to have the thing lean one way or another? I mean, hey; the tire looks vertical to me right now with the car at rest. Unfortunately, when the car's or truck's chassis goes through a turn, it leans toward the outside of the curve (even pan cars lean). This, along with changes in wheel angle caused by caster, alters the angle at which the tire meets the road. Camber is the suspension designer's way of allowing you to compensate for these situations.

There are excellent tools available from RPM\* and RACETech\* that allow you to simply and quickly set camber and discover the camber settings that work for you and your pit buddies. The RPM camber gauge consists of a simple set of marked plates held together by a screw and a plastic knob. One of the plates has a small foot molded to the lower edge. Loosen the knob, place the foot on a flat surface with its vertical edge next to your front or rear tire and wheel, and the



*This RPM camber gauge is a handy, inexpensive tool that you'll find in almost every pro racer's pit bag. It's simple to use, and it works!*

amount of camber in degrees can easily be read where the pointer and degree marks meet. Simple! You can also preset the tool, screw down the knob and change your tires' camber until it precisely matches the setting you've chosen. The

RACETech gauges (available for most pan-car "strut" front ends and for off-road vehicles) are more complex and feature specialized jigs that are attached to the vehicle's front/rear suspension to accurately measure the setting.

If you decide not to invest in one of these special tools, you can still make the adjustments you need; it just takes a little ingenuity. Place a steady, straight, vertical object (like a can of motor cleaner or traction compound) next to the tire. If your car has some negative camber already, you'll see a little daylight at the top of the tire where it doesn't quite meet the side of the can. Measure this gap with something you have in your pit (like a small ruler or the width of the head of a particular screw), and make the gap larger or smaller (use a larger or smaller screw head) according to the change you wish to make. Using the can and the screw will allow you to pretty closely duplicate the settings from tire to tire, even though it won't tell you exactly how many degrees of camber you're working with. If you set your mind to it, you'll probably be able to come up with many ways to make this simple measurement. It's also a good idea to write down what you've done so that if the change doesn't work, you'll be able to refer back to your notes and restore the original settings. Don't just start wrenchin' away before you know where you're starting.

#### TOE-IN

Have you ever heard the term "pigeon-toed"? How about "duck feet"? They refer to situations in which the toes point inward or outward, relative to the leg, or the direction of travel. In R/C, we call this toe-in (where the front edges of the tires point inward) and toe-out (the tires point outward). These two settings can have an enormous impact on your car's handling and steering, and you should definitely experiment with them.

A little toe-in generally makes the car



**It's easy to eyeball your toe-in settings: start with them as close to straight ahead as you can, and then alter each side by the same number of turns on the turnbuckle linkage.**

track better on the straights and be a bit more "forgiving" when exiting turns under power (it will be less likely to spin out). A little toe-out tends to make the car steer more aggressively through tighter turns but might cause it to "wander" a bit down the straights. Keep in mind that too much toe-in or toe-out will make the tires fight each other as you drive down the straight and can cause weird handling problems that defy even expert diagnosis. You really have to try these changes with your own car to know precisely what effect they will have.

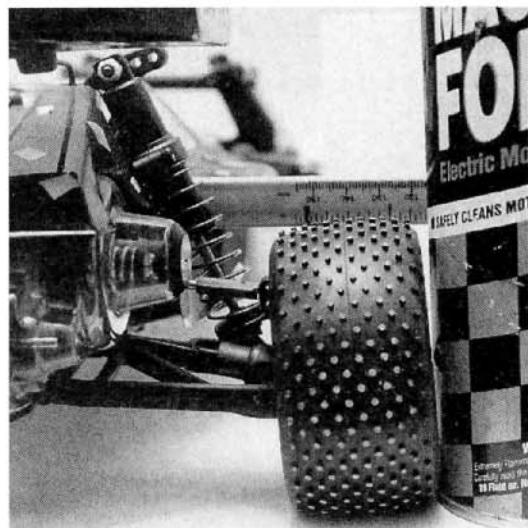
But how do you figure out what settings you have now (your baseline) or how much they change as you fiddle with the links? There are a number of complex, precise measuring devices on the market. For example, the RACETech Off-Road Alignment Gauge mentioned earlier tells you in fractions of degrees what your toe angle is. I've even seen tools that require you to remove the kingpins and replace them with pointers. That seems like a lot of work to me, especially if I'm just trying to figure out what effect a little change is going to have on my vehicle. I'm not sure that I'm a good enough driver to figure out fractional toe-in changes.

I usually eyeball my car by setting it on its side so that one front tire and one rear tire are sitting flat on the table or workbench. Any toe is evident from the angle of the front tire that's up in the air, and I can easily alter the steering linkage to accommodate any changes that I want to make. Since I always use turnbuckles for steering linkage and I always place the left-handed threads on the left side of the car (pretty tricky, eh?), I always know which way to turn the links to make them longer or shorter (longer links equal toe-in; shorter links

result in toe-out). A quarter turn or half turn of each turnbuckle at a time is enough to change the toe setting by  $\frac{1}{2}$  degree or 1 degree.

Another way to change the toe setting is to draw two straight, parallel lines on a large sheet of poster paper.

Set your car or truck on the lines, and you'll be able to see any deviation from a straight line very easily. You can even measure how far away the front and rear edges of the tire are from the line and record this as you make your toe-setting changes. Whichever way works for you is OK; the important thing is to keep



**It's possible to keep track of camber changes without using a special tool; all you need is a stable, vertical object and a way of measuring the distance between the vertical object and the top of the tire. A can and a ruler or any object that fits into the gap will work just fine.**

records and to be willing to experiment.

The most important thing to remember when making any changes to your car's setup is this: make only one change at a time! If, for example, you change your toe-in angle, swap rear tires and fill your front shocks with different oil all at once, you'll have absolutely no idea which change actually made a difference.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.

## SERPENT IMPACT 2

(Continued from page 72)

Because I was reviewing the car between race meetings of the local gas-car club, I was unable to test it in the heat of battle on an actual racetrack. Instead, I visited a local church parking lot (I know the minister, and their lot is empty on weekdays), laid out an impromptu course with plastic paint buckets and set out to see what the Impact 2 would do. Let me tell you, my friend, if you've never hit the track with a really fast gas-powered car, you can't possibly understand what R/C speed is all about!

I would hit the throttle hard at one end of the 100-foot-plus straightaway, and the car would just take off! Like a rocket! In less time than it takes to tell you about it, I had to hit the binders for the entrance to the infield turns. The bottom-end grunt of the Mega SX-15 combined with the smooth transition of the 2-speed transmission and the really effective disk brake made it incredibly easy to look smooth and professional as the car drifted around the tight turns. Cruising out onto the sweeper before the straight, the car would just squat down as it hit second gear and roar off down the straightaway again ready to dive through the infield as fast as I dared. True exhilaration!

The scale, detailed Serpent Mercedes body made my antics look like the real thing on a European road-racing course. I ran the car for an hour, until my radio batteries started to give out. Every once in a while, I'd bring the car in, drip some water on the engine-head to make sure it wasn't too hot, fill up the tank and head out again. If it hadn't been dinner time, I'd have been willing to go a lot longer! The small group of spectators who had heard the car and had come to see what was going on were not disappointed.

### FINAL THOUGHTS

So, after all the late nights, figuring out the assembly manual and learning how to set up a gas engine, and buying all the support stuff you need to make a gas car hum, would I do it all over again? Absolutely! I thought that I had seen and done just about everything in R/C land, but I had no idea that there was so much fun involved in running a gas-powered car. I'm not sure that the Serpent Impact 2 is for everyone: it's expensive, complex and very, very fast. On the other hand, if you've been running electric cars for a while, you are able to handle the speed and complexities of modified on-road racing and you're willing to pay the freight to get the best equipment you can buy, then this is undoubtedly the car for you. Just be careful...it's ssillyfast!

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.



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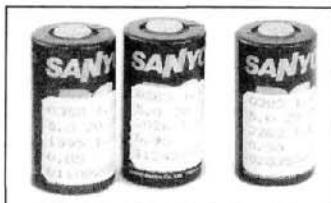
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much power for me. Tightening the unit to five teeth open restored the lost power and acceleration. For use on stadium trucks, the unit was tightened even further to three teeth open.

### CONCLUSION

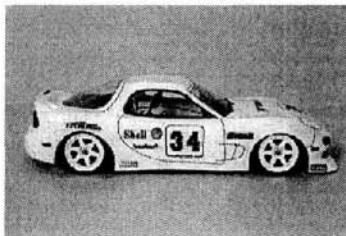
When the units are properly adjusted, their performances are very similar. You'll notice the biggest difference when you fine-tune to track conditions. The Visco Drive allows fine adjustment and is marginally lighter, so it could be more attractive to some racers. If ease of conversion is more important to you, the Hydra Drive is a good choice.

Racers sometimes want to win so badly that they try every new part to get the edge. Racers can hamper performance by improperly adjusting their new, trick parts. Instead of just imitating other drivers' setups, decide for yourself whether you need either of these units, and get the one that best suits your needs. If you don't need one, save the money for better batteries, a faster steering servo, or practice at your local track. If you aren't following the competition, you might just find yourself passing them.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.

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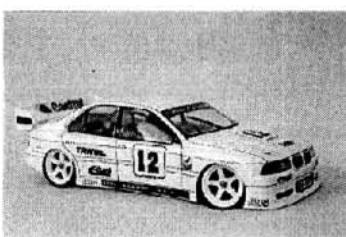
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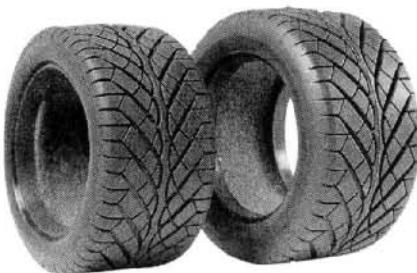
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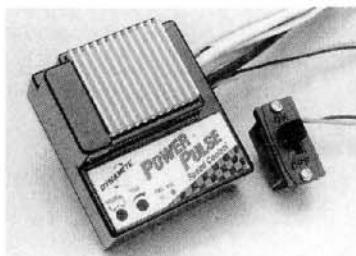
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Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.



DYNAMITE

### Power Pulse ESC

This reversing ESC features Backstop Time Sharing™, which allows 1 second of adjustable braking before reverse kicks in; PowerBoost™ BEC; low resistance; a quick, easy, dual-LED setup; and thermal overload, reverse polarity and fuse protection. This ESC is compatible with JR, Futaba and Hitec radio systems, and it can handle 6- and 7-cell battery packs and up to 13-turn motors.

**Part no.—DYN4900; price—\$89.95.**

Dynamite; distributed by Horizon Hobby Distributors Inc., 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355.

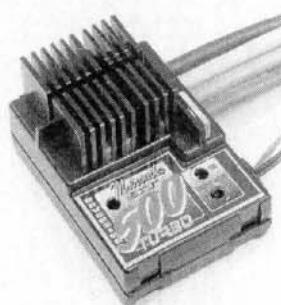
PARMA

### Dodge Stratus Body

This new 1/10-scale body is made of 0.040-inch clear Lexan. Its included wing and slick lines allow it to generate a lot of downforce for great handling. This body will best fit Tamiya, Yokomo 4WD and Kyosho narrow sedans.

**Part no.—10186; price—\$21.**

Parma International Inc., 13927 Progress Pky., North Royalton, OH 44133-4394; (216) 237-8650; fax (216) 237-6333.



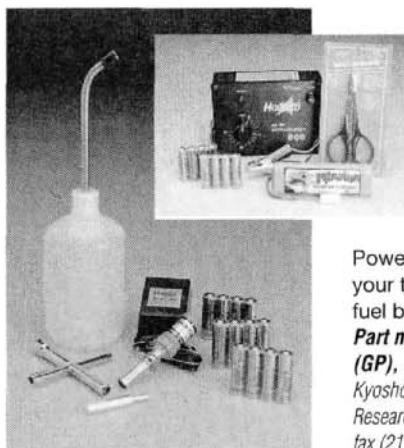
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This high-quality, fully proportional reversing speed control features high-grade Turbojet™ MOSFETs, protected 1.5A BEC, LED setup, Linear Over Temperature Shutdown, 12-gauge leads with connectors, input pulse filtering and a small case. It will handle modified motors down to 16 turns.

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Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



KYOSHO

### Race Packs

These race packs include all the tools and accessories needed to finish and operate an R/C car kit. The Electric Power (EP) pack includes a 6-cell 1400mAh battery pack, eight AA alkaline transmitter batteries, an AC/DC auto-charger and Lexan scissors. The Gas

Power (GP) pack includes 12 AA alkaline batteries for your transmitter and radio system, a glow starter, a fuel bottle, a four-way wrench and Lexan scissors.

**Part nos. and prices—KYOC0600 (EP), \$89.99; KYOC0605 (GP), \$76.99.**

Kyosho; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

TEAM ORION

### Super Charger

This charger features a 1A to 5.5A charge rate, digital peak detection, reverse-voltage protection, "Hi-Mid-Low" pulse selector, a dual-LED indicator, output shock protection and MOSFET pulse charge. It can charge 4- to 8-cell packs.

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Team Orion; distributed by Peak Performance, 23352-J Madero Rd., Mission Viejo, CA 92691; (714) 707-4683; fax (714) 707-4684.



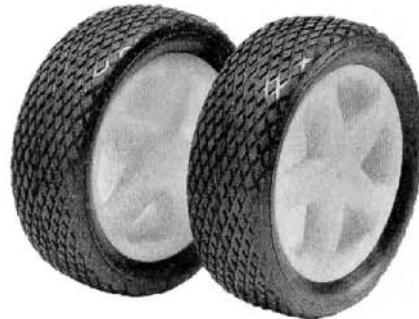
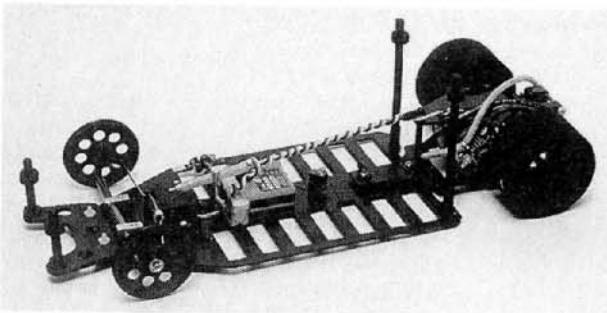
GRAND MOTOR-  
SPORTS

### Pro Stock Drag Kit

This new kit includes a unique motor-mounting system that allows racers to clean the motor between rounds without having to make any gear-mesh adjustments. The graphite chassis has an adjustable traction system for all track types, and it uses very light aluminum hubs, rear axle carriers and front suspension. The kit also includes tires, mounting posts and all the necessary hardware.

**Part no.**—GMPS800; **price**—\$249.95.

Grand Motorsports, 9360 Newton Ave. N., Brooklyn Park, MN 55444; (612) 424-5535; fax (612) 424-5757.



### TEAM LOSI Diamond Tires

These new 2.1-inch front tires feature a series of diagonal cutouts across the carcass that form diamond-shaped patches. Available in both Gold and Silver compounds, the tires are perfect for blue-groove conditions, asphalt, carpet, artificial turf and concrete surfaces. They come with foam inner liners and will fit all popular 2WD front wheels.

**Part nos.**—A-7203G (Gold);  
A-7203S (Silver); **price**—\$11/pair.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.



ASSOCIATED

### RC10B2 T-Shirt

Owners of the RC10B2 can now have a full-color depiction of this world championship car on a 100-percent-cotton T-shirt. The shirt features the same design on the front and back and is available in four sizes.

**Part nos. and prices**—SP-38 (M, L, XL), \$11;  
SP-38XXL (XXL), \$13.

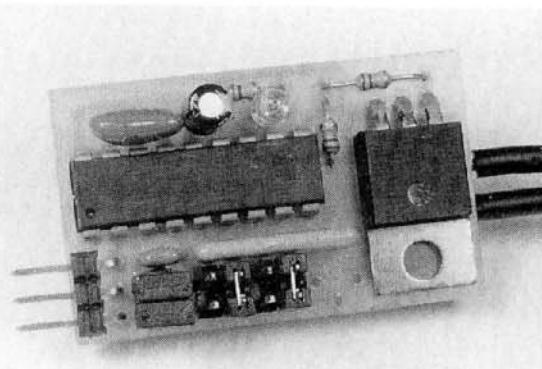
Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

### HITEC HS-700BB 1/4-Scale Servo

Built to withstand the rigors of large-scale projects, this servo features a custom integrated circuit with surface-mount technology, a top ball bearing, a glass-filled nylon case and a heavy-duty horn set. It boasts 133 oz.-in. of torque and 0.22 second of travel time.

**Part no.**—HS-700BB;  
**price**—\$44.95.

Hitec RCD Inc., 10729  
Wheatlands Ave., Ste. C, Santee,  
CA 92071; (619) 258-4940;  
fax (619)  
449-1002.



### PRECISION MICROELECTRONICS GlowDriver

The GlowDriver enables you to install an on-board glow-plug system that will keep your glow plug hot when your engine needs it the most. Designed for use with all popular AM, FM and PCM radio systems, the GlowDriver connects the throttle servo and the receiver and can be set to turn off after the throttle has been advanced a certain amount. It can also reverse its direction of operation; a safety feature will turn off the GlowDriver when your transmitter is off.

**Part no.**—GD220L; **price**—\$30.95 (does not include servo plug, Ni-Cd cell or locking glow-plug clip).

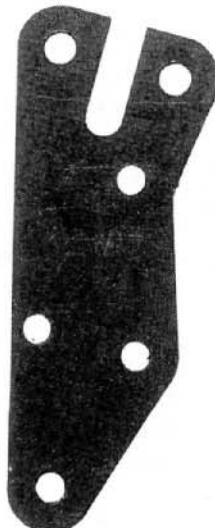
Precision MicroElectronics, P.O. Box 3129, Corpus Christi, TX 78463-3129, (512) 815-0336; fax (512) 814-5843.

### MIP Temp Mount

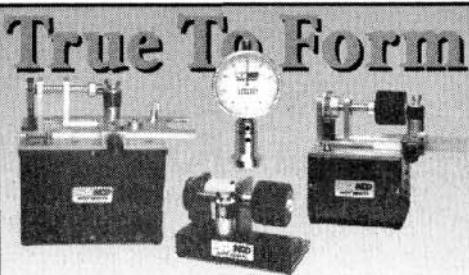
This new, compact, super-lightweight mounting bracket for your On-Board Temp Gauge™ is made of thin fiberglass and is simple to install.

**Part no.**—3607;  
**price**—\$4.

MIP, 746 E. Edna Pl.,  
Covina, CA 91723;  
(818) 339-9008;  
fax (818) 966-2901.



*Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 100 East Ridge, Ridgefield, CT 06877-4606.*



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## ROAR STOCK NATIONALS

(Continued from page 119)

holeshot and never looked back as he claimed the victory with Dustin Brewer and Rod Rippee in second and third. Parkhurst bounced back from a poor showing in the second Main to win the third Main. Lundahl finished second, and Brewer third. When the points had been totaled, Chad Lundahl took the win with Richie Parkhurst and Dustin Brewer second and third.

• **Junior.** The Junior results followed suit, with three different winners in the three Mains. Dustin Brewer was victorious in the first Main. Eric Willardson took the win in the second, and Ryan Thompson brought home the gold in the third. The overall winner was Eric Willardson, fulfilling a three-year quest for a national title in this class. Second place went to Dustin Brewer, and Adam Zakis of the Zakis racing team/family finished third.

• **Masters.** The multi-winner pattern continued. Andy Zakis Sr. took the win in the first Main, Chris Perry won the second and TQ Gil Losi Sr. the third. The overall top three for the Masters class were: Chris Perry in first place, Gil "I don't care where I finish as long as I beat Bob Novak" Losi Sr. second place and Kirk Brawley third.

• **4WD.** Brian Gisi at last broke the "different winners" pattern. He easily won the

first two Mains, claimed a national championship and earned the right to sit out the third Main. Kenny Nelson, who placed second in the first two Mains, won the third one and placed second overall. Andy Zakis Jr. rounded out the top three.

### WHO SAYS STOCK CLASS ISN'T EXCITING?

The Stock Nationals are competitive races and fun to attend. The absence of factory-sponsored drivers and the use of handout motors makes the competition fair, yet heated. As you've seen, it isn't likely that one driver will dominate, win the first two Mains and sit out the third. It isn't likely that one driver will win any two Mains, for that matter. This race can also be educational because several manufacturers send a factory driver or representative to help the racers successfully race.

Congratulations to Andy Zakis Sr. on winning the Sportsman award. This is a special award voted on by the racers. The largest trophy of the event is presented for this title. Andy was willing to help anyone at any time.

I also congratulate Craig Sturm, Marshal Skare and the rest of the Valley Hobbie crew for another fine race. A good time was had by all.

\* Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

## PEAK PERFORMANCE MOTORS & SCOTTSDALE R/C SPEEDWAY

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**Location:** SRS Scottsdale R/C Speedway, 3023 N. Scottsdale Rd., Scottsdale, AZ 85251

**Classes:** 2WD Novice • 2WD Stock • 2WD Modified • Truck Novice • Truck Stock • Truck Modified • 4WD Modified

**Schedule:** Saturday, 10 A.M. Qualifying • Sunday, 10 A.M. Qualifying followed by Mains

**Entry:** \$25 for each class

**Rules:** Roar Rules apply. Everyone must run a 24 degree motor in Stock Classes. Stock motors are not supplied.

**More Information:** Call SRS (602) 945-2186

### PEAK PERFORMANCE ENTRY FORM

Driver \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**Class(es) (Circle):** 2WD Novice 2WD Stock 2WD Modified Truck Novice Truck Stock Truck Modified 4WD Modified

2WD Freq. 1st \_\_\_\_\_ 2nd \_\_\_\_\_ 3rd \_\_\_\_\_

MT Freq. 1st \_\_\_\_\_ 2nd \_\_\_\_\_ 3rd \_\_\_\_\_

4WD Freq. 1st \_\_\_\_\_ 2nd \_\_\_\_\_ 3rd \_\_\_\_\_

Make Check Payable to:  
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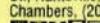
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### ALABAMA

**Berry R/C Raceway**, Main St., Berry, AL 35543; Ronny, Don, (205) 932-3189  


**Hobbytown USA Raceway**, 450-D Schillinger Rd. N., Mobile, AL 36608; Rob & Kari Baker, (334) 633-8446  


**Phenix Raceway & Hobby**, 2006 Opalika Rd., Phenix City, AL 36867; Chris Watson, (334) 296-9786  


**R/C Hi-Tech Raceway**, 3303 Meridian St., Huntsville, AL 35811; Rick Chambers, (205) 539-1347.  


**Lagoon Park R/C Raceway**, 2730 Lagoon Park Dr., Montgomery, AL 36109; Alex Love, (334) 272-6438  


**Spring Cove Speedway**, Rt. 1, Box 95, Florence, AL 35360; Chuck or Lyda Sypolt, (205) 757-5998  


**Thunder Road Speedway**, 108 Park Rd., Pleasant Grove, AL 35127; Jim or Cheyenne Kearney, (205) 744-0107  

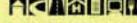

### ALASKA

**ARCOR**, 2812 Spindrift Rd., Anchorage, AK 99503; Jim Rafuse, (907) 277-7778  


**Fairbanks R/C Car Club**, 510 Janeau Ave., Fairbanks, AK 99701; Dan Anderson, (907) 456-5494  

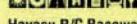

### ARIZONA

**Cottonwood R/C**, S. 6th St., Cottonwood, AZ 86322; Sal Cirincione, (520) 567-6830  

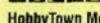

**Fast Line Hobbies**, 2141 S. Industrial Pk. Ave., Tempe, AZ 85282; Rob Zoller, (602) 956-8166  


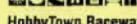
**Finish Line Raceway**, 7025 E. 21st St., Tucson, AZ 85710; Justin, (520) 747-3633  


**Frank's Hobby House**, 19401 N. Cave Creek Rd., Phoenix, AZ 85024; Marty, (602) 992-3495  


**G & Raceway**, 967 Hancock, Bullhead City, AZ 86442; Bob Olsen, (520) 758-1100  


**Hasavas R/C Raceway**, 1400 S. SmokeTree (Rotary Park), Lake Havasu, AZ 86403; Jeff Roe, (520) 855-2226  


**High Desert Raceway**, 2570 Neal Ave., Kingman, AZ 86401; Bryce Cole, (520) 757-4498  


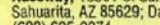
**HobbyTown Mountain Raceway**, 1500 E. Cedar Ave., Cedar Hills Shopping Center, Flagstaff, AZ 86004; Richard, (520) 214-9887  


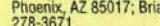
**HobbyTown Raceway**, 9180 E. Indian Bend Rd., Scottsdale, AZ 85250; Dennis, (602) 948-3946  


**HobbyTown Raceway**, 1915 East Baseline Rd., Gilbert, AZ 85234; Kenny, (602) 892-0405  


**Hobbytown Raceway**, 2814 W. Bell Rd., Phoenix, AZ 85023; Mike Kaminski, (602) 993-0122  


**Hobbytown Raceway**, 1102 E. 22nd St., Tucson, AZ 85704; Adam Crippen, (520) 882-8888  

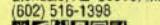

**Quarter Flash's Squirtin' Dirt Raceway**, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave or Randy, (602) 625-9274  


**R/C Sports Mania**, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671  


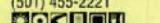
**Scottsdale R/C Raceway**, 3023 N. Scottsdale, Scottsdale, AZ 85251; Scott Anhinson, (602) 945-2186  


**Speedway Hobbies**, 2710 N. Steve's Blvd., Suite #8, Flagstaff, AZ 86004; Gary McAllister, (602) 556-0710  


**Trax Raceway**, 401 E. Wilcox Dr., Sierra Vista, AZ 85635; Sam Schaler, (520) 452-9704  


**USA Speedway**, 5947 W. Alameda, Glendale, AZ 85310; Michael Fleek, (602) 516-1398  


### ARKANSAS

**A.R.C.C.A.**, 13703 Pleasant Hill Rd., Little Rock, AR 72209; Jim Kifer, (501) 455-2221  


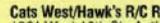
**Flyin' W R/C Raceway**, 957 B. Sunrise Ave., Springdale, AR 72762-3944; Brian or James Watkins, (501) 750-7716  

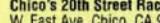

**R/C Motorplex**, 204 Best Industry Dr., Jonesboro, AR 72401; David Hill or Kevin Brady, (501) 931-3278  

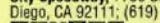

**Sparks R.C. Raceway**, 7194 Greene 721 Rd., Paragould, AR 72450; Tommy or Daniel Sparks, (501) 239-3606  

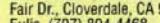

### CALIFORNIA

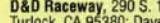
**California City R/C Car Track**, 8349 Jacaranda Ave., California City, CA 93505; (619) 373-3765  

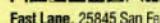

**Cameron Park Raceway**, 1305 Cameron Ave., West Covina, CA 91790; Carl A. McVey, (818) 962-1120  


**Cats West/Hawk's R/C Raceway**, 1201 West 10th St., Antioch, CA 94509; Jerry Winkelman, (510) 779-1665  


**Chico's 20th Street Raceway**, 236A W. East Ave., Chico, CA 95926; David Brown, (916) 893-6443  


**City Speedway**, 7750 Convoy Ct., San Diego, CA 92111; (619) 560-9633  


**Cloverdale R/C Raceway**, 1 Citrus Fair Dr., Cloverdale, CA 95425; Bob Eulie, (707) 894-4468  


**D&D Raceway**, 290 S. 1st Street, Turlock, CA 95380; Dave Miller or Lee Cisco, (209) 667-0907  


**Fast Lane**, 25845 San Fernando Rd., #21, Saugus, CA 91350; (805) 255-2404  

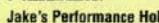

**Freedom Park Raceway/Ventura Roadrunners**, Freedom Park Dr., Camarillo, CA 93010; Wayne Evans, (805) 656-RACE  

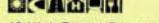

**Gold Nugget Raceway**, 4650 Skyway, Paradise, CA 95969; Marvin's R/C hobbies, (916) 877-7363  


**Greater Los Angeles R/C Racing Club**, 3756 Cardiff Ave., #305, Los Angeles, CA 90034; Nikko Ko  


**Hobby Central Raceway**, 34255 P.C.H., Unit 107, Dana Point, CA 92629; John, (714) 488-8095  

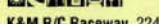

**Hobby Paradise Raceway**, 1880 Art Gonzales Pkwy., Selma, CA 93662; Steve Keiser, (209) 896-4804  


**Hobby Warehouse**, 5500 So. Watt, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587  


**Jake's Performance Hobbies**, 6650 Commerce Blvd., #21, Rohnert Park, CA 94928; Jake, (707) 586-3375  


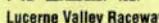
**JC High Desert Raceway**, Gorgonio Rd., Phelan, CA 92329; JC Fletcher, (619) 668-4834  


**JD Hobbies**, 1009 W. College Ave., Santa Rosa, CA 95401; Mike, (707) 571-1700  

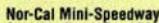

**Just for Fun R/C Raceway**, 509 S. State St., Ukiah, CA 95482; Don, (707) 462-7305 days  


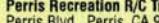
**K&M R/C Raceway**, 22474 A Barton Rd., Grand Terrace, CA 92324; Mike Blake, (714) 783-0899  

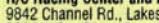

**KW Raceway**, 5630 Ager Rd., Montague, CA 96064; Keith Wilson, (916) 459-3787  


**Lodi's Radio Control Speedway**, 1033 Black Diamond, Ste. B, Lodi, CA 95240; Mike Belanger, (209) 334-5681  


**Lucerne Valley Raceway**, 32800 Old Woman Springs Rd., #4, P.O. Box 2047, Lucerne Valley, CA 92356; Frank Rodriguez, (619) 248-7305  


**M n M Hobbies**, 4225 Prado Rd., Suite 103, Corona, CA 92320; Joe Stanovich, (909) 272-3545  


**Nor-Cal Mini-Speedway**, 519 Bush St., Woodland, CA 95695; Steve Van Atta, (916) 668-5678  


**Perris Recreation R/C Track**, 120 N. Perris Blvd., Perris, CA 92370; (909) 943-6603  


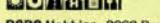
**R/C Racing Center and Hobbies**, 9842 Channel Rd., Lakeside, CA 92040 (San Diego County); Russ or Cindy Escalera, (619) 443-2270  

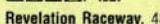

**R/C Sports**, 759 E. Monte Vista Ave., Vacaville, CA 95588; (707) 446-5555  

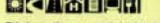

**Race Prox Raceway**, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800  

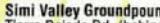

**Valley West R/C Club**, 2202 I Road, Grand Junction, CO 81505; Waymond Williams, (970) 242-8846  

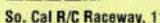

**Rams 1/8-scale Gas**, Mission College, Lot B, 3000 Mission College Blvd., Santa Clara, CA 95054-1897; Ken Kimbrow, (408) 238-2089  

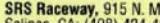

**Ranch Pit Shop**, 1655 E. Mission Blvd., Pomona, CA 91766; Ken Shintani, (909) 623-1506  


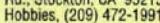
**RCR Hobbies**, 2069 Pacific Coast Hwy., Lomita, CA 90717; Rhea & Cliff Fisher, (310) 530-7272  


**Revelation Raceway**, 4871 State St., Montclair, CA 91762; Tim Bump, (909) 464-8247  


**Rickey Racers**, 14568 Arrow Hwy., Fontana, CA 92335; (909) 822-0226  


**Simi Valley Groundpounders**, 205 Tierra Rejada Rd. (behind Simi Valley Drive-In), Simi Valley, CA 93065; Jack Kasten, (805) 584-8211  


**So. Cal R/C Raceway**, 11930 Valley View St., Garden Grove, CA 92645; Jim Blauvelt, (714) 892-0088  


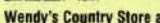
**SRS Raceway**, 915 N. Main St., Salinas, CA; (408) 424-4044  


**Stockton Raceway**, 3133 N. Adart Rd., Stockton, CA 95215; Ultimate Hobbies, (209) 472-1991  

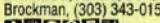

**Team Air Racing Club**, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-7488  


**Track Heaven**, 6196 Child's Ave., San Diego, CA 92139; Loure, 475-2020  


**Tri-Valley Auto Racers**, Livermore Elks Club, 940 Larkspur, Livermore, CA 94550; Roger Van Maren, (510) 449-0982  

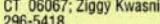

**Ultimate Hobbies**, 2143 N. Tunstall Ave. #6, Orange, CA 92665; Cliff Murakami, (714) 921-0424  


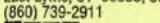
**Valley R/C Racepark**, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (909) 654-1505 or 658-4322  

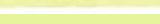

**Wendy's Country Store and More/O.R.C.A. Racing Club**, 5475 Skyway, Paradise, CA 95969; Alan Evans, (916) 872-9363  


**MHOR R/C Speedway**, 15540 East Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151  


**S&T R/C Raceway**, 323 Auburn Dr., Colorado Springs, CO 80909, Tim Bishop, (719) 574-2910  

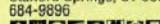

**Valley West R/C Club**, 2202 I Road, Grand Junction, CO 81505; Waymond Williams, (970) 242-8846  


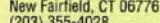
**CONNECTICUT**  
**E.A.R.T.H.**, 2380 Main St., Rocky Hill, CT 06067; Ziggy Kwasnicki, (860) 296-5418  


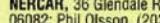
**Race Prox Raceway**, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800  


**East Lyme R/C Kar Klub**, Society Rd., East Lyme, CT 06333; Steve Brown, (860) 739-2911  


**NORRA**, 3300 Santa Barbara Blvd., Naples, FL 33999; Jerry Pecar, (941) 455-9065 or Mark Benfield, (941) 263-6861  


**Ocala Radio Control Car Club**, 3500 SE 30th Terrace, Ocala, FL 34471; Steve Shook, (904) 694-5147  


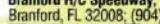
**PC Madness**, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501  


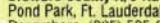
**Terryville Hobby**, 153 S. Riverside Ave., Pequabuck, CT 06781; Harry or Ray, (203) 584-5562  


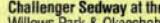
### DELAWARE

**Hobby Stop Speedway**, RD 1, Box 240, Seaford, DE 19973; Remy Haynes, Jr., (302) 629-3944  

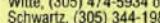

### FLORIDA

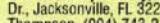
**B+T R/C Central**, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1666  


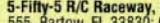
**Branford R/C Speedway**, RT. 3, Box 240, Branford, FL 32008; (904) 935-0758  


**Broward County R/C Race Club**, Mills Pond Park, Ft. Lauderdale, FL; Ed Decembero, (305) 525-3304  


**Challenger Sedway at the Willows**, Willows Park & Okeechobee Blvd., Royal Palm Beach, FL 33414; Walt (407) 965-2790, or Mark (407) 790-6917  

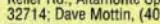

**Coral Springs Roadrunners**, P.O. Box 9632, Coral Springs, FL 33075; Randy Witte, (305) 474-5934 or Rick Schwartz, (305) 344-1983  


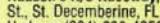
**First Coast Speedway**, 6410 Walther Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161  


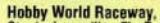
**5-Fifty 5-R/C Raceway**, State Road 555, Brawley, FL 33830; Chuck Nolke, (813) 324-7406  


**Frontier Race Track**, 15260 N.E. 244th Ave., Salt Springs, FL 32134; Harold Reel and Don Combee, (352) 685-2881  


**Greater Orlando Auto Racers**, 970 Keller Rd., Altamonte Springs, FL 32714; Dave Mottin, (407) 323-4819  


**Hudson's R/C Raceway**, 590 Madeo St., St. Decemberine, FL 32095; Steve Hudson, (904) 862-4050  


**Hobby World Raceway**, 7273 103rd St., Jacksonville, FL; Ray or Greg, (904) 772-9022  


**Louie Burton's R/C Raceway**, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (813) 665-1322  


**Miami R/C Raceway**, 12546 S.W. 88 St., Miami, FL 33101  

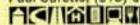

**Morris Kohl's Raceway and Hobby Shop**, 1202 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626  


**My Rose**, 1695 W. Indianant Rd., Jupiter, FL 33458; Mark Watson, (407) 744-3800  


**NORRA**, 3300 Santa Barbara Blvd., Naples, FL 33999; Jerry Pecar, (941) 455-9065 or Mark Benfield, (941) 263-6861  


**Ocala Radio Control Car**

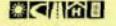
**Paul's Stadium Raceway**, 4511 W. Dr., M.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette, (813) 872-8662



**PBG R/C Motor Park**, 6351 Barbara St., Palm Beach Gardens, FL 33418; Doug Gleason, (407) 743-9791 or Tim Case (407) 627-2608



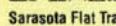
**Pro Hobbies Speedway**, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



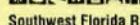
**Red's R/C Raceway & Hobbies, Etc.**, 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330



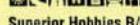
**River City R/C Car Club**, 9711 Shoring Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



**Sarasota Flat Track**, 4900 Fruitville Rd., Sarasota, FL 34232; Jim Wilson, (941) 371-3689



**Southwest Florida R/C Raceway**, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (813) 455-1143



**Superior Hobbies R/C Parking Lot Racing**, 430 E. Hwy. 436, Suite #106, Casselberry, FL 32707; Robbie Michael, (407) 834-9299



**Tampa Bay R/C Club**, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744



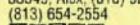
**Three Flags R/C Racetrack**, 1755 East S.R. 44, Wildwood, FL 34785; Don Meares Sr., (904) 748-3870; fax (904) 748-5263



**Treasure Coast R/C Club**, 4931 Oleander, Fort Pierce, FL 34982; Lou, (407) 464-3207



**West Coast R/C Club**, Lake Park, 17203 N. Dale Mabry, Tampa, FL 33549; Alex, (813) 920-7448; Bert, (813) 654-2554



**Winterset Raceway**, US Rt. 27 South, Winterset Motel, Sebring, FL 33872; John Bisbee or Max Mixe, (941) 699-1140 or (941) 385-4448

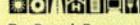


## GEORGIA

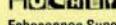
**A&S Hobbies & Raceway**, 3389 Cypress Mill Rd., Brunswick, GA 31520; Edward Davis, (912) 264-5489



**Dalton Raceway**, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699



**Dry Branch Raceway**, 3751 Gallu Dr., Dry Branch, GA 31020; David Stomper, (912) 477-0139; Brandon Mercer, (912) 746-7519



**Echeconnee Superspeedway**, 2149 Richardson Dr., Macon, GA 31208; Andy Thompson/Cliff Kline, (912) 788-8731



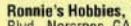
## KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

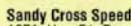
**Lake Mayer Raceway**, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098



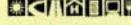
**The Racer's Edge**, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls, (706) 648-2637



**Ronnie's Hobbies**, 17050 Jimmy Carter Blvd., Norcross, GA 30092; Gregg Mundkowsky, (404) 246-0808



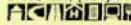
**Sandy Cross Speedway**, Rt. 1, Box 1071, Hwy 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573



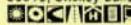
**SHILOH R/C Raceway**, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912) 794-2507



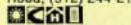
**Silver Wings Raceway**, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (404) 991-2225



**Sugar Bowl R/C Speedway**, 5272 Nelson Brogdon Blvd., Sugar Hill, GA 30518; Shelley Bailey, (770) 945-6709



**Valdosta Hobbies**, 950 N. St. December, Valdosta, GA 31601; Ron Hood, (912) 244-2101



## HAWAII

**Garden Isle R/C Racers**, 5855 Ahakea St., Kapaa, Kauai, HI 96746; Arnold Morales, (808) 823-0856



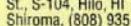
**Keehi Lagoon Park**, Leeward Community College, Waipahu, HI 96797; (808) 676-5486



**Maui R/C Racing Association**, 430 Hookahi St., #13, Wailuku, HI 96793; Tritsch R/C Hobbies; Radio Control Association, (808) 244-0526



**Radio Control Hawaii**, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629



**Team PRC Racing Club**, 176 Mamo St., Hilo, HI 96720; Charlie Kawamoto, (808) 935-3561



## IDAHO

**Capital Dirt Burners**, 1200 S. Artesian #12, Eagle, ID 83616; Brian Fulkerson, (208) 939-4816



**River City Bandits**, 4867 N. Yellowstone, Idaho Falls, ID; Chris Hummer, (208) 523-9846

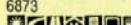


**Snake River R/C Raceway**, 265 Highway 50, Hansen, ID 83334; Jim Tattersall, (208) 423-5122

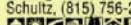


## ILLINOIS

**Ameri-Trac**, RR 3, Box 242; Mattoon, IL 61938; Ben or Judy Giles, (217) 235-6873



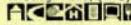
**AJ's Raceway & Hobby**, 10211 Kesslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772



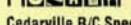
**BARR**, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



**B.G. R/C Racing & Hobbies**, 56 E. Ferguson, Wood River, IL 62095; Ben or Judy Giles, (618) 254-6301



**C&R Hobbies**, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-4073



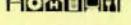
**Cedarville R/C Speedway**, 430 W. Washington, Cedarville, IL 61013; Troy Poko, (815) 745-2885



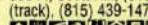
**Diehard R/C Raceway**, 300 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 852-3700



**Hoopy Town Raceway**, 4611 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777



**Leisure Hours R/C Raceway**, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)



**Machesney Park**, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311



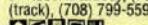
**Mitey Motor Speedway**, 1109 N. Bloomington St., Rte. 23, Streator, IL 61364; Doug, (815) 672-4212



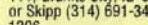
**Monroe R/C Raceway**, 26049 Ridgeland Ave., Monroe, IL 60449; Roy or Roberto Moody, (708) 534-2422 (track), (708) 799-5597



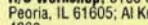
**Pontoon Raceway**, 3670 St. Route 111, Granite City, IL 62040-4304; Pat or Skipp (314) 691-3482, (618) 931-1206



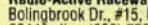
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



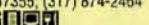
**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



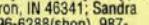
**R.C.R.C. Raceway of Salina**, 1300 E. Crawford, Bill Burke Park, Salina, KS 67401; Calvin Cap, (913) 823-9588



**R/C World of Indiana**, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



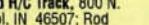
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



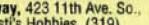
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



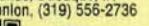
**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



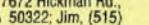
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



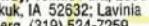
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



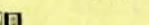
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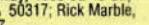
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



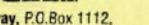
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



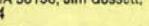
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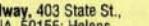
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



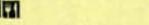
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



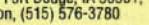
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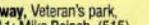
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



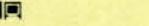
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



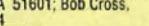
**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



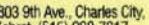
**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



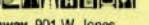
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



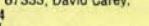
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



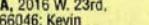
**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



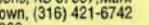
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



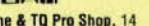
**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



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**Rod's Off-Road R/C Track**, 800 N. Division, Bristol, IN 46507; Rod Harm, (219) 848-7848



**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)

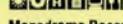


**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113

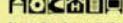


# PRO-LINE TRACK DIRECTORY

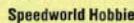
**Hi-Tech Hobbies**, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373



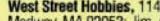
**Megadrone Raceway**, Rt. 8, Curran Hwy, North Adams, MA 01247; Bob Blanchette, (413) 743-7223



**New England R/C Headquarters**, 33 Fr. Devilles Blvd., Fall River, MA 02721; Chuck Gregory, (508) 673-6069



**Speedworld Hobbies**, 134 Water S., Wakefield, MA 01880; (617) 245-3922



**West Street Hobbies**, 114C Main St., Medway, MA 02053; Jim, (508) 533-1231



## MICHIGAN

**Akright Outback Racing**, 984 Zimmer Rd, Williamston, MI 48895; Steve Akright, (517) 655-4531



**Capital Area Racing Society**, The Plumbers Hall, 5405 S. Logan, Lansing, MI; Dave Halsey or Brad Smith, (517) 648-8224 or (517) 484-4028



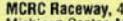
**Down River R/C Association/Riders**, 1519 Oak St., Wyandotte, MI 48192; Dave McCaslin, (313) 287-7405 or (313) 284-1560



**Freedom Hill R/C Raceway**, 29330 Coolidge, Roseville, MI 48066; Curley Grewe, (810) 776-5483



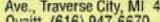
**Ludington R/C Raceway**, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



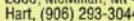
**MCRC Raceway**, 4601 Page Ave., Michigan Center, MI 49203; Sam Sprang, (517) 787-9161



**M&W R/C Speedway**, 16199 Common Rd., Roseville, MI 48066; Wilson Tang, (810) 771-3322



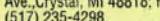
**N.W. Michigan R/C Club** 744 Munson Ave., Traverse City, MI 49686; Jim Ovaitt, (616) 947-6670



**Newberry R/C Raceway**, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart, (906) 293-3044



**R&L Hobbies & Racing**, 9782 Portage Rd., Portage, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744



**Rainbow Gardens**, 600 North Shore Ave., Crystal, MI 48818; Mike or Sandy, (517) 235-4298



**USA Raceways**, 6083 Dixie Hwy., Bridgeport, MI 48722; Dave Killingsworth, (517) 777-7784



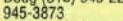
**Vicksburg Off-Road R/C Raceway**, 50201 Silver St., Vicksburg, MI 49097; Jeff Schroeder, (616) 375-8591



**Village Hobbies-n-Crafts**, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



**West Michigan R/C Racers Club**, 814 E. Railroad St., Hastings, MI 49058; Doug (616) 948-2287 or Pat (616) 945-3873



**Westside R/C Raceway**, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Orlikowski, (616) 791-9902. (Open December through December)



## MINNESOTA

**Badger R/C Raceway**, 404 Tamarack St., Box 101, Badger, MN 56714; Keith Cumming, (218) 386-2001



**Duey's Hobbies & R/C Raceway**, 6600 Cahill Ave., Inver Grove Heights, MN 55076; Duey Carlson, (612) 450-1721



**Grand Rapids R/C Speedway**, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751



**Greater Minnesota Racin' Place**, 3302 Southwest Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



**Hyperspeed Indoor**, 410 2nd St. NE, Milaca, MN 56353; Randy Reiman, (612) 983-6329



**J's R/C Raceways**, Rte. 2, Box 266, Starbuck, MN 56381; Jay Campbell (320) 239-4827



**Larry's Raceway Park**, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (612) 634-5246



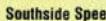
**Minn-E-Golf & Hobby**, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



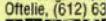
**Paul Bunyan Raceway**, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749



**R/C Racing World**, 235 Main Ave. North, Harmony, MN 55939; Mark McKay, (507) 886-5931 or (507) 886-2224



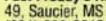
**Southside Speedway**, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233



**Trackside Racing**, 443 8th Ave. NW, New Brighton, MN 55121; Winton Oftelie, (612) 633-2112



**Wild West R/C Speedway**, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

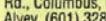


## MISSISSIPPI

**Fast Freddy's Raceway**, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315



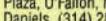
**Joe McFaden Hobbies**, 1619 51st Ave., Meridian, MS 39307; Joe McFaden, (601) 483-7000



**Rural Hill Raceway**, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429

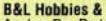


**Small Cars Unlimited**, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST



## MISSOURI

**All Seasons Hobby**, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767



**B&B Hobbies & Raceway**, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (314) 431-9444



**Blue Vee Speedway**, 12019 E. 47th St., Kansas City, MO 64133; Mark Randal, (816) 358-0238



## MISSOURI

**Columbia R/C Trax**, 1502 W. Bus. Loop 70 (Exit 125), Columbia, MO 65202; Gary Philippe, (314) 682-3993



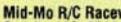
**Fire Mountain Raceway**, 8647 Commercial Blvd., Pevely, MO 63070; Dan Gordon, (314) 475-6449



**GreenTree R/C Racepark**, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194



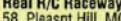
**Hobbies 'n Stuff Raceway**, 102 West Pearce Blvd., Wentzville, MO; Tim Satchwell, (314) 327-6006



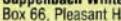
**Mid-Mo R/C Raceway**, 400 W. 2nd., Sedalia, MO 65301; (816) 826-5113



**Ozarks R/C Raceway**, Hwy 13, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-4376 or (417) 742-2561



**Real R/C Raceway**, 22420 State Rt. 58, Pleasant Hill, MO 64080; Steve Hale, (616) 540-5584



**Suppenbach Winter Racing**, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828



## MONTANA

**Stormer Raceway & Slot Motorplex**, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569



**Thunder Road Racetrack**, 110-E Centennial Dr., Livingston, MT 59047; Dominic Papa, (406) 222-1352



## NEBRASKA

**Goodyear SuperSprinters and Off-Road**, 4021 North 56th, Lincoln, NE 68510; Tom or Bob, (402) 464-5000



**Mr. Bill's**, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4665



**Wild Card Raceway**, RR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743

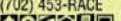


**Winners' Circle**, 3368 N. 88th Plaza, Omaha, NE 68164; Robert Conner, (402) 571-1821



## NEVADA

**Dansey's Indoor R/C & Hobbies**, 741 N. Neilis, Las Vegas, NV; David Lugo, (702) 453-RACE



**SilverBowl Speedway**, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577

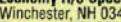


**Western R/C Raceway**, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg, (702) 897-7227

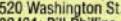


## NEW HAMPSHIRE

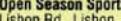
**Economy R/C Speedway**, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470



**Fastracker Club**, 520 Washington St., Keene, NH 03430; Bill Phillips or John O'Connor, (603) 357-8393



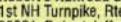
**Open Season Sports Center**, Rt. 302, Lisbon Rd., Lisbon, NH 03585; Joseph Wiggett, (603) 838-6602



**Outback Raceway**, East Washington Rd., P.O. Box 508, Bradford, NH 03221; Jim or Bill Thompson, (603) 938-2425



**Robert's Railroad and Hobbies**, 1335 1st Nth Turnpike, Rte. 4, Northwood, NH 03261; Robert Jeffers, (603) 942-5193



**Chipmunk Hill R/C Speedway**, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065



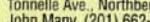
## MISSOURI

**RT 106 Racepark**, 743 Clough Mill Rd., Pembroke, NH 03275; Douglas Graves, (603) 224-RACE

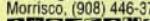


## NEW JERSEY

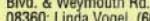
**America's Hobby Center Inc.**, 18300 Tonelle Ave., North Bergen, NJ 07047; John Many, (201) 662-0777



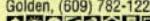
**Bob's American Raceway**, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morris, (908) 446-3737



**Family Hobbies Raceway**, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790



**Golden Hobbies Raceway**, 415 Erial Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222



**Jefferson Speedway**, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525



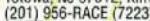
**Jerry's Hobby Center & Raceway**, 336 Rt. 22W, Greenbook, NJ 08812; Jerry or Gary, (908) 752-6030



**LBRA Track**, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122



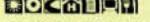
**Millville R/C Oval**, 114 N. High St., Millville, NJ 08332; William Denstoz, (609) 327-4640



**Pit Stop Dragway**, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)



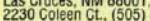
**The Race Place**, 1151 Hwy. 33, Farmington, NJ 07731; John Fary, (908) 938-5215



**Nebraska**, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422



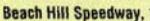
**Zeppelin Hobbies**, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717



**Meerscheidt R/C Raceway Park**, Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 528-4863, (505) 526-1758



**Ringwood Junction**, 1922 Dryden Rd., Freeville, NY 13068; Steve Miller, (607) 347-4198



**Schoharie Co. R/C Car Club**, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



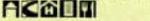
**Small Torque Racers of Long Island**, 13 Melony Ave., Plainview, NY 11803; Thomas Bolger, (516) 938-9005



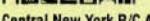
**Southerier Raceway**, 88 Paige St., Owego, NY 13827; Anita Harding, (607) 687-5395



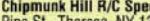
**South Shore Hobby & Raceway**, W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567



**Speedworld R/C & Hobby**, P.O. Box 482, Chenoa Bridge, IL 61345; Michael Magnusson, (607) 648-2063



**Tri County Remote Control Car Club**, 33 West Decker St., Johnston, NY 12095; Jim Sprouse, (518) 762-8884



**Ulster County Speedway**, P.O. Box 71, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664



**Walt's Hobby**, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



**Westfield R.C. Speedway**, 27 Clark St., Westfield, NY 14878; John or Jared Lindstrom, (716) 326-2339



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**protoform #1408—1996 Audi A4**

fiend racer Daryl Silva is the '96 NORCA national champ with his Protoform-body Spectre.

Thanks to the on-road racers for trusting our "production" bodies to be competitive at the IFMAR Worlds. It's our sincere hope that IFMAR will soon draft and enforce sensible body rules to ensure that the A-Mains at the '98 Worlds won't look like an episode from the cartoon "Speed Racer." We are concerned that any desire to maintain an element of "realism" has been forgotten by IFMAR (the sanctioning body that governs the world's top form of miniature auto racing).

Thanks and congratulations to the racers mentioned here and to those who are out racing every weekend at the local level. You go out racing to have fun with friends or family; you hope to learn one new "trick" that will help you go a little faster; and you often experience the satisfaction of knowing that you helped someone. It may be someone younger or less experienced, or someone with a "thin" wallet. Sometimes, there's no "Thank you," but you do it anyway. We were all there once. Helpful attitudes and actions like yours will make R/C racing stronger and more enjoyable.

**New and Hot**

1406*	1996 Benz C-Class (ITC) with 2 wing sizes
1407	Peugeot 905B on-road (wide) available in 1407H (high downforce)
	1407 (medium downforce) 1407L (low downforce)
1408*	1996 Audi A4 (BTCC) touring car with 2 wing sizes
1409*	1996 BMW 318i (BTCC) touring car with 2 wing sizes
1410	1996 Camaro (Trans Am Series) for Associated Dual Sport
1512	1997 Ram off-road truck for RC10GT (fits wide shock towers)
1513	Ripper Double-X 'CR' with wing for Losi Double-X 'CR'
1514	1997 Chevy C-1500 off-road truck for Associated RC10T2

\*Fits Tamiya, Yokomo YR-4 and HPI RS4 (narrow).

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**Whitestone**, 30-56 Whitestone Expy. (Dept. of Motor Vehicles), Flushing, NY 11374; Rudolf Ardilla, (718) 966-6155



**ZOAR Road Speedway**, 15318 Armes Ct., Gowanda, NY 14070; David & Gordon Ackler, (716) 532-9463

**NORTH CAROLINA**

**The Antique Barn**, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Seidlinger, (919) 237-6778



**Badin Shore Raceway**, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, (910) 431-6407



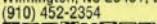
**C/C Hobby Speedway**, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482



**C&H Raceway**, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321



**Cape Fear Speedway**, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (910) 452-2354



**Carolina Dragway**, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569



**Carolina Hobbies R/C Raceway**, Route 1, Box 158, Taylorsville, NC 28861; Kim & Roseanne Kulawik, (704) 495-4040



**Carolina Motorsports**, 1517 Blandwood Dr., High Point, NC 27360; (910) 885-3713



**Clapp's R/C Motor Speedway**, Rt. 4, Box 300A, Siler City, NC 27344; Al Clapp, (919) 663-5198



**Clinton R/C Raceway**, 907-C Warsaw Rd., Clinton, NC 28328; Corbitt Marshburn, (919) 592-9489



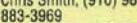
**Hobby Club R/C Raceway**, 1241 Buck Jones Rd., Raleigh, NC 27606; Hobby Club, (919) 460-8838



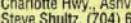
**King R/C**, P.O. Box 897, Five Forks Village, King, NC 27021; Chris Smith, (910) 983-3969



**King Super Speedway**, 143 Industrial Dr., P.O. Box 897, King, NC 27021; Chris Smith, (910) 983-5598 or (910) 883-3969



**Mine Hole Gap R/C Raceway**, 1297 Charlotte Hwy., Asheville, NC 28730; Steve Shultz, (704) 628-3020



**Ride & Slide R/C Raceway**, 5319 Yadkin Rd., Fayetteville, NC 28303; Jim Woodman, (910) 425-5276 or Bill Culbertson, (910) 867-4202



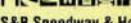
**R&J Off-Road Racing**, 6172 Blalock Rd., Lumberton, NC 27851; Robert Williams, (919) 239-0853 or Jonathan Jenkins, (919) 746-2703



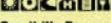
**R.J.S. R/C Parkway**, Rt. 9, Box 651, John B. Carter Rd., Fayetteville, NC 28301; Tony Starling, (910) 486-4820



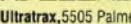
**Rosewood R/C Speedway**, 651 Community Dr., Goldsboro, NC 27530; Glenn Elam, (919) 731-4734



**S&B Speedway & Hobbies**, Rt. 1, Box 311A, Farmville, NC 27828; Ricky Strickland, (919) 753-4422



**Sandhills Raceway Inc.**, US #1 South, Aberdeen, NC 28315; (919) 944-7414



**Ultratrax**, 5505 Palmers Branch, Leland, NC 28451; Mike Williams, (910) 313-0350



**NORTH DAKOTA**

**Hacienda Hills Speedway**, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 639-4419



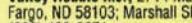
**Northern Mini Racers**, P.O. Box 415, Minot, ND 58702; Roger Lee, (701) 839-5294



**Surrey International Raceway**, RR 1, Box 37, Norwich, ND 58768; Marlen Lenton, (701) 728-6760



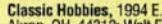
**Valley Hobbies Inc.**, 2714 Main Ave., Fargo, ND 58103; Marshall Skare, (800) 493-9971

**OHIO**

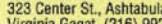
**Aerotech Raceway**, 409 Apple Grove Rd., North Canton, OH 44720; (216) 499-1300



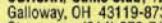
**Classic Hobbies**, 1994 E. Waterloo Rd., Akron, OH 44312; Walt Ellis, (216) 733-6400



**C/R Hobbies and Raceway**, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833



**CORCAR/Sams Club**, 128 Amity Rd., Galloway, OH 43119-8732; Bill Stevenson, (614) 870-7159



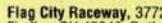
**D&J R/C Raceway**, 801 W. Market St., Orrville, OH 44657; Don Yoder or Mark Nussbaum, (216) 682-4266



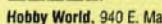
**D&S Hobbies Raceway**, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112



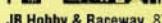
**Flag City Raceway**, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589



**Hoopy World**, 940 E. Main St., Ravenna, OH 44266; Thomasor Jeremy, (330) 296-0894



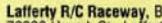
**JB Hobby & Raceway**, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222



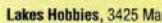
**Kent Hobby**, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422



**Lafferty R/C Raceway**, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818



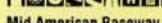
**Lakes Hobbies**, 3425 Manchester Rd., Akron, OH 44314; Roy Spencer, (330) 645-6912



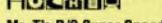
**Medina R/C Raceway**, 754 N. Court St., Medina, OH 44256; Bill Aholt, (216) 723-0255



**Mid American Raceway**, 13150 Airport Hwy., Swanton, OH 43558; Bill or Chuck, (419) 475-9459



**Mr. T's R/C Super Speedway**, 5540 CR 16, Wauseon, OH 43567; Nick Tinsler, (419) 335-3196



**Performance R/C Club of Ohio**, 2206 13th St. NE, Canton, OH 44705; Greg Ledbetter, (216) 453-7089



**Scooter's Hobby Hut**, 234 Robbins Ave. #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411



**Steel Valley Hobbies & Raceway**, 157 N. 4th St., Steubenville, OH 43952; William Northrop, (614) 282-3003



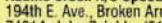
**Van Wert R/C Raceway**, 112 W. Main St. (above Tom's Donuts), Van Wert, OH 45891; Charlie Hile, (419) 238-4917



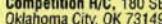
**Y-City Hobby & Speedway**, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025

**OKLAHOMA**

**Adams Creek R/C Speedway**, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beigle, (918) 355-1416



**Competition R/C**, 180 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809

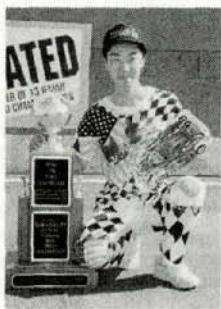


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# PRO-LINE® JACO

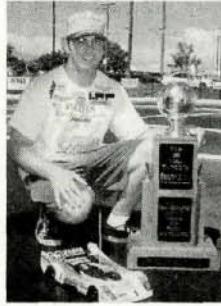
## World Championships



### 1/12 Scale

Masami Hirosaka used Pro-Line/Jaco Purple fronts (part no. 2325) and Pink rears (2342) to TQ and win the '96/97 1/12-Scale IFMAR World Championship. In fact, an unprecedented 10 out of 10 drivers in the A-Main

chose the superior traction of Pro-Line/Jaco tires. To further illustrate how dominant the tires were, the top 19 finishers and over 85 percent of the drivers ran Pro-Line/Jaco Purple fronts and Pink rears!



### 1/10 Scale

Mike Swauger drove to victory at the 1/10-Scale IFMAR Worlds on Pro-Line/Jaco Pink fronts (2124) and White rears (2144). He also used this combination to TQ, as did nine out of 10 A-Main drivers. Once again, Pro-Line/Jaco

tires were the choice of the vast majority of the racers. We thank all the racers who used our tires at the World Championships and those who use our tires to dominate on local tracks.

### Helpful Hint #5

#### How to Win the Worlds

It is the dream of every driver to win a world championship—the ultimate accomplishment for any R/C racer. Most people don't realize the preparation it takes to compete and win at this level. In addition to fast tires, slick bodies, quick motors and great batteries, it takes countless hours of practice and chassis tweaking just to compete. It's no different for the manufacturers. Most of the major manufacturers did some form of testing prior to the race. For up to eight months before the race and then at the race, we at Pro-Line/Jaco tested and went through more than 6,000 pairs of tires. Don't be discouraged by all this. The hard work and practice that you put into your racing will someday pay off in a big way. And rest assured, all the testing done by the manufacturers will lead to innovative products that will take you to the winners' circle.

### RACING TO BRING YOU THE BEST!

P.O. Box 456, Beaumont, CA 92223;  
(909) 849-9781; fax (909) 849-2968

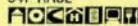
**Coweta Hobby & Speedway**, 310 S. Broadway, Coweta, OK 74429; Derald Seabolt, (918) 486-3948



**Off-Road Car Assoc. of Tulsa**, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528



**Remote Control Race Course**, 400 S. Vermont Ave., Suite 104, Oklahoma City, OK 73108; Rick or Steve, (405) 947-RACE



**Wild Country Speedway**, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686



### OREGON

**Competition Racing Assoc.**, 17941 NE Gilsan, Portland, OR 97230; Mark Taylor, (503) 761-1334



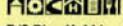
**Eugene R/C Raceway**, W. 11th and Befline, Eugene, OR 97402; John Demings, (503) 718-0065



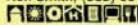
**Junior Vehicle Speedways**, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090



**Pit Stop Hobby**, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (503) 265-2825



**R/C Plus Hobbies Raceway**, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188



**R/C Speed Center**, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298



**Yamhill County R/C Car Club**, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234



### PENNSYLVANIA

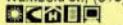
**A&D's Bumps & Jumps**, RR7, Box 7395C, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750



**Bachman's Speedway & Hobbies**, Box 306, Effort, PA 18330-0306; Jeffrey Bachman, (610) 681-5845



**Benders Junction Speedway**, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161



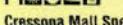
**Brookville Hobby Shop**, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385



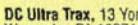
**CEB Motors R/C Div.**, 5743 Molly Pitcher Hwy., Marion, PA 17325; Charlie Booze, (717) 375-4635



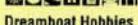
**Clearyfield R/C Car Club**, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045



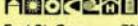
**Cressona Mall Speedway**, Rt. 61, Pottsville, PA 17901; (717) 385-3506



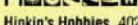
**DC Ultra Trax**, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200



**Dreamboat Hobbies**, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



**East St. Raceway**, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



**Hipkin's Hobbies**, 402 W. Avondale Rd., West Grove, PA 19390; Doug, (610) 869-8585



**Hobby America Raceway**, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



**Hobby House Raceway**, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (610) 269-1300



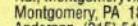
**Koontz's Home & Hobby Center**, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



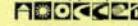
**Kranzel's R/C Raceway & Hobbies**, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



**Lug Nut Raceway**, Rt. 309 at Hartman Rd., Montgomeryville Mart, Montgomery, PA 18936; Kathy Anderson, (215) 542-8250



**Marshall's R/C Raceway**, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



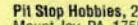
**The Mushroom Bowl**, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850



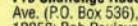
**Owens Race-A-Rama**, RR 2, Box 98 F, Hunlock Creek, PA 18621; Rany Owens, (717) 477-3220



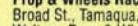
**Pinion Twisters**, 3M Plant, Green Ln. and Mitchell, Bristol, PA; John (215) 632-9744; Bob (215) 945-0325



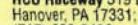
**Pit Stop Hobbies**, 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr., (717) 653-6222



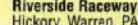
**Pro Challenge Raceways**, Wycombe Ave., P.O. Box 536, Lansdale, PA 19050; Bob Paulavage and Don Fawkes, (610) 622-7651



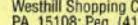
**Prop & Wheels Raceway**, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288



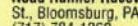
**RCO Raceway**, 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490



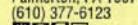
**Riverside Raceway**, PA Ave. W. & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



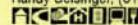
**Rolling Wheels R/C Raceway**, Westhill Shopping Center, Coraopolis, PA 15108; Peg, (412) 262-4858



**Road Runner Raceway**, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260



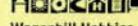
**S.A. Hi Banks**, Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 377-6123



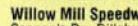
**Sinking Spring Race Center**, 237 South Hull St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760



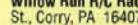
**Staub Bros. R/C Speedway**, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445



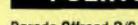
**T-N-T Raceway**, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821, (717) 967-2604; Frenchie (607) 775-1756



**Wagonhill Hobbies**, 967 New Castle Rd., RT 422, Butler, PA 16001; Jeff Hyatt, (412) 865-8877



**Willow Mill Speedway**, 37 N. Season's Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445



**Willow Run R/C Raceway**, 135 Wright St., Corry, PA 16407; Jim Small, (814) 664-8147

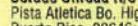


**Hacienda Muñoz R/C Track**, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083

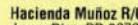


### PUERTO RICO

**Dorado Offroad R/C Track**, Pista Atletica Bo. Higuerill, Dorado, Puerto Rico 00646; Roberto Lamosi/Jaime Ramos, (809) 796-5603 or (809) 796-1734



**Hacienda Muñoz R/C Track**, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083



### RHODE ISLAND

**Rhode Runner Raceway**, 20 State St., Bristol, RI 02809; Bill or Betsy, (401) 254-0409

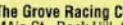


**SK Hobbies Inc.**, 15 Carl St., Johnston, RI 02919; Slim or Keith, (401) 453-1440

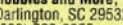


### SOUTH CAROLINA

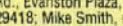
**Extrem R/C Raceway**, 5976 Grace Lane, Myrtle Beach, SC 29577; Kevin Bullock, (803) 236-2083



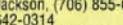
**The Grove Racing Center**, 1765 E. Main St., Rock Hill, SC 29730; Myke Durham, (803) 327-4121



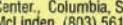
**Hobbies and More**, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355



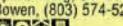
**J&M R/C Hobbies**, 5341 Dorchester Rd., Evanson Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449



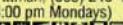
**ORA Atomic Racing Facility**, 373 Boyd Pond Rd., Piney Grove Shopping Center, Columbia, SC 29212; Clifford McLinden, (803) 561-0000



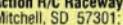
**Racer's Choice Remote Control**, 4014 Fernandina Rd., Piney Grove Shopping Center, Columbia, SC 29212; Clifford McLinden, (803) 561-0000



**The Great Escape**, 105 Franklin Ave., Spartanburg, SC 29301; Jonathan Bowen, (803) 574-5273



**World Hobbies**, 707 Sulphur Springs Rd., Greenville, SC 29611; Bob Pittman, (803) 246-4702 (Closed after 4:00 pm Mondays)



### SOUTH DAKOTA

**Action R/C Raceway**, 107 N. Main, Mitchell, SD 57301; (605) 906-6895

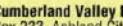


**Dakota Off-Road Racers**, 2989 W. Br. St., Aberdeen, SD 57401; (605) 226-0604

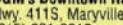


### TENNESSEE

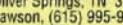
**Cumberland Valley Raceway**, P.O. Box 233, Ashland City, TN 37175; Jamie Pate, (615) 792-4371, ext. 1195



**D&M's Downtown Raceway**, 2703 US Hwy. 411S, Maryville, TN 37303; (615) 681-8919



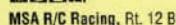
**Lawson Raceway**, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (615) 995-9351



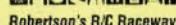
### KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

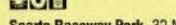
Machine-Head Straits, 938 Grandmère Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630



MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027



Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423



Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, Rt. 5 Box #652, Sparta, TN 38583, (615) 836-0450 or (615) 761-3407

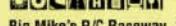


Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwaine Romine, Kyle Romine, (615) 376-2330, 376-9955



## TEXAS

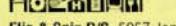
AA Raceway, 1617 Foomey Rd., Austin, TX 78704; Wolf Gumpfory, (512) 474-8277



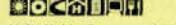
Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814



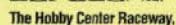
Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Tom Keller, (713) 399-9777



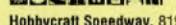
Flip & Spin R/C, 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311



Hal's Hobby Raceway, 1440 Bessemer, El Paso, TX 79936; (915) 591-2213



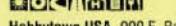
The Hobby Center Raceway, 14104 Stan Schieler Loop, Suite 1, Killeen, TX 76543; Lawrence Remick, (817) 690-7311



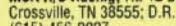
Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761



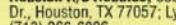
Hobbytown USA, 7516 FM 1960 W., Houston, TX 77070; Fred Pfafman, (713) 955-7097



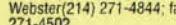
Hobbytown USA, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Bairdon, (210) 829-8697; fax (210) 829-8707



Houston R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006



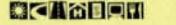
Indy R/C World, 220 Saturn Rd., Garland, TX 75041; Steve Webster, (214) 271-4844; fax (214) 271-4502



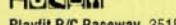
Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett, (409) 693-8095



North Houston Speedway, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471



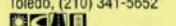
Performance Raceway, 1106C Witte Rd., Houston, TX 77055; Frosty Sinclair or Richard Oliver, (713) 464-4458



Playit R/C Raceway, 3518 W. Loop 306, P.O. Box 5245, San Angelo, TX 76902; Sammer Favre, (915) 942-6469



Rivercity Speedway, 11731 Wetmore, San Antonio, TX 78247-Ralph Hernandez, (210) 359-6870; Joe Toledo, (210) 341-5652



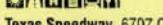
Rough Country, 905 Jacksboro Hwy., Wichita Falls, TX 76301-5310; Robert Kerr, (817) 322-2453



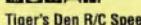
Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 881-6105



T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562



Texas Speedway, 6707 Chimney Rock, Belaire, TX 77401



Tiger's Den R/C Speedway, 702 E. Board, Mansfield, TX; Bullet Bob, (817) 477-5513



T.O. Offroad Raceway, 6236 Quail, El Paso, TX 79924; Elen Saenz, (915) 821-7522



Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224



## UTAH

Fastrax, 205 N. Carbon Ave., Price, UT 84501; Dave Johnson, (801) 637-6603



Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303



WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530



## VERMONT

Barre Town R/C club, 14 SouthMain St., Wall St. Complex, Barre, VT 05641; Russ Tribble or pete Perreault, (802) 888-2860 or (802) 476-9458



Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674



Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321

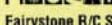


## VIRGINIA

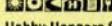
Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 23111; Bob Wagner, (804) 746-2758



Cooper's R/C Raceway, Rt. 4, Box 122B, Chatham, VA 24531; (804) 724-4182



Fairystone R/C Speedway, Rt. 4, Box 918, SR635 Goblintown, Stuart, VA 24171; Pat Moon Jr., (540) 930-3984



Hobby Hangers Speedway, 4433 A, Brookfield Corp. Dr., Chantilly, VA 22021; Mark or Billy, (703) 631-8820



The Hobby House, 116 Edds Ln., Sterling, VA 20165; Ron Beckman, (703) 444-0333



KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596



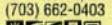
Olide Towne Hobby Shoppe, 9105 Center St., Manassas, VA 22110; Arnie Levine, (703) 369-1197



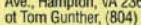
Roadmasters/Rick's Hobbies, 12201 Balls Ford Ave., Manassas, VA 22110; Rick, (703) 330-6833



Shamrock Raceway, P.O. Box 3739, Winchester, VA 22601; Kevin Allen, (703) 662-0403



Trackside Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell or Tom Gunther, (804) 723-4170



## WASHINGTON

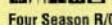
Allie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638



A-Main Raceway, 14011 NE 3rd Ct., Vancouver, WA 98685; Monty Coleman, (360) 571-8404



Burien Toyota R/C, 15025 1st Ave. South, Seattle, WA 98148; Ray Meek, (800) 654-6456



Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (360) 491-2430



Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374; Walt Hale, (206) 845-7675



Hannegan Speedway, 4212 Hannegan Rd., Bellingham, WA 98225; Dana Hoggarth, (360) 734-4090



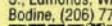
Jim's Wings & Wheels Raceway, 1827 S. Washington, Kennewick, WA 99337; (509) 586-7420



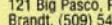
L&L R/C Raceway, 15818 S.E. 287th, Kent, WA 98042; Bob Lewis, (206) 631-1664



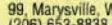
Raceway Hobbies, 188 Sunset Ave. S., Edmonds, WA 98020; Brian Bodine, (206) 774-3285



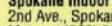
Rattlesnake R/C & Raceway, Brag T-121 Big Pasco, Pasco, WA 99301; Bill Brandt, (509) 545-4495



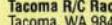
Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838



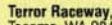
Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE



Tacoma R/C Raceway, 6305 6th Ave., Tacoma, WA 98406; Scott Brown, (206) 565-1935

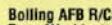


Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8659



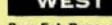
## WASHINGTON, D.C.

Bolling AFB R/Car, Bolling Air Force Base, Washington, DC 20332; Charles Leadbetter, (301) 843-7230 or Doug Balzer, (540) 338-3602

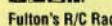


## WEST VIRGINIA

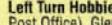
Burr-Fab Raceway, 90 Davis St., West Union, WV 26456; Mark Travis, (304) 873-2487



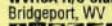
Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26303; James Fulton, (304) 233-5355



Left Turn Hobbies, 100 Saco Ln. (by Post Office), Glen White, WV 25849; Stretch, (304) 255-3930



WVRCA R/C Club, 142 West Main, Bridgeport, WV 26330; D.W. Weed

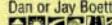


## WISCONSIN

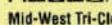
ABC R/C, 244 W. Main St., Waukesha, WI 53186; Dick, (414) 542-1245



Bayland Hobbies, 9510 Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288



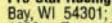
JJ's Dirt Heaven, 6028 County Road K, Champion, WI 54229; Jim or Jeff Jansen, (414) 666-9096



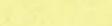
Mid-West Tri-Clone, 3745 Shuster, West Bend, WI 53095; Tom Holt, (414) 334-0429



NASCAR Raceway, 4331 E. Wall St., eagle River, WI 54521; Mary O'Brien, (715) 479-5154



Pro-Star Racing, 726 Pine St., Green Bay, WI 54301; Chuck, (414) 494-1233 or Terry, (414) 469-5566



## S&N's Trackside Hobbies and

Runaway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

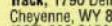


Sparta R/C Raceway, R&S, Sparta, WI 54656; Eric Johnson, (608) 269-6613

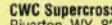


## WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156



CWC Supercross, 113 S. 3rd E., Riverton, WY 82501; Lasting impressions, (307) 857-2068



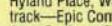
## ARGENTINA

Club A. Velez Sarsfield, Av. J.B. Justo 9000, C.P. 1404, Buenos Aires; Jorge Herrero, 54-01-658-5826

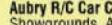


## AUSTRALIA

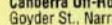
A.C.T. Model Car Racing Club, offroad track—Wannissa Raceway, Hylde Place, Wannissa, ACT, indoor track—Epic Complex, Northbourne Ave., Canberra North A.C.T.; Gary Davey, 61-28714111



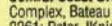
Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 080-247-128



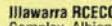
Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-241-3070



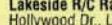
Central Coast ORRC, EDSACC Sports Complex, Bateau bay, N.S.W. Australia 2261; Peter J.Knight, 011-61-43-693-698



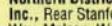
Jillawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683



Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; R. Bartolozzi, 62-2-907-9800



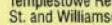
Northern Districts Model Rally Club, Inc., Rear Stanford centre, 16 Stanford Way, Malaga, Western Australia 6066; G. Thirlwell, 61 (9) 249 3855; fax 61 249 477-88; email tony@oiz.com.au



Templestowe Flat Track Racers, Templestowe Reserve, Corner of Porter St. and Williams Rd., Templestowe, Melbourne, Victoria 3106; Renato Benci, 61 (3) 9553 4625



Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128

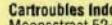


## BELGIUM

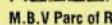
ATR-Alka-Tele-Racing, 3570 Stationstraat 21, Alken Limburg; 0032-11-25-49-03



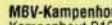
Cartroubles Indoor Buggy Track, Jan Moonstraat 52-56, 2160 Wommelgem, Belgium; Guy Ermes, 32-3-326-51-15; fax, 32-3-326-51-01



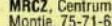
M.B.V Parc of Rest, Tenierslaan 28, B-1910 Kampenhout, Belgium; Frank Mostrey, fax (32) 01-6657518



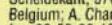
MBV-Kampenhout, Tenierslaan 28, B-1910 Kampenhout, Belgium; Frank Mostrey, phone and fax (0) 16-65-75-18



MRC2, Centrum, De Burg, Belgium; Montie, 75-71-63



Model Racing Club Oudenarde, Scheldekaat, 9700 Oudenarde, Belgium; A. Chantier, 32-33-31-36-48; fax, 32-55-30-19-12



East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9, Gary Stephen, (902) 569-3262



Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084



Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411



## BRAZIL

## TRACK DIRECTORY

**Fly'N Bryan's Radical Raceway & Little Shop of Hobbies**, RR #1, Site 12, Comp. 49, Chase, British Columbia, Canada V0E 1M0; Bryan Coffey/ Dani Potvin, (604) 955-0669



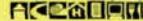
**House House Motor Speedway**, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530



**Interior R/C Raceway**, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhoven, (604) 374-1268; (604) 374-8458



**J-T International Raceway**, 127 Milligan Lane, Nanapoint, Ontario K7R 8A1; N. O'Neill, (613) 354-0099



**Mid-Canada R/C Speedway**, 1678 St. James St., Winnipeg, Manitoba R3H 0L3; Richard Driedger, (204) 339-6566



**Minutres & Passions**, 204 St. Charles, #103, Ste. Therese, Quebec, Canada J7E 2B4; Gilles Lachance, (514) 979-7989



**MORRAC Raceway**, 6449 Crowchild Tr. SW, Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386



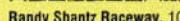
**Off-Road R/C Raceway**, 76 Eddystone Ave., North York, Ontario M3N-1H4; Ron Lefebvre, (416) 740-0536



**Prince George Radio Controlled Car Club**, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035



**Quintrax Speedway**, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306



**Randy Shantz Raceway**, 1015 W. 14th St., North Vancouver, British Columbia; Steve Mulhall, (604) 945-3888



**R/C Champ Raceway**, 670 Progress Ave., Rear Unit #13-16, Scarborough, Ontario, M1H 3A4; Ben MAtthew or Louie (416) 289-8717



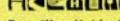
**RC World**, 7070 Haldibrook Rd., RR #1, Caledonia, Ontario N3W 2G8; Don Nicholls (905) 679-3177 or Keith Sequin (905) 388-9855



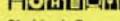
**Recreation R/C Raceway**, Hwy 16 and Ferry Ave., Prince George, BC; Doug Waller, (604) 561-0035



**Ronbo's R/C Racing**, RR 1 Glen Walter, Cornwall, Ontario K6H 3G4; Ron Giroux, (613) 936-0176



**Roussillon Hobby Track**, 177-D St-Jean Baptiste, Chateauguay, Quebec J6K 3P4; (514) 698-2151



**Sheldon's Raceway**, Box 597, Cutknife, Saskatchewan; Sheldon Bradlow, 398-2232



**Spinnin Wheel Raceway**, RR 1, Ariss, Ontario N0B 1B0; (519) 824-1614



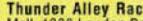
**South Okanagan Roadhogs**, Skaha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698



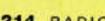
**Strathclair Park**, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855



**Sudbury Organized Auto Racing**, 765 Barrydowne Rd., Sudbury, Ontario P3A 3T6; Ken Moore, (705) 524-5339



**Thunder Alley Raceway**, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361



## GERMANY

**Dreykorn Raceway**, Heuchlinger-Hauptstr. 43, Lauf, 91207; Hermann Hensel, 09123-8145



**MC Koin**, Bottgerstr., Worringen, Germany 50789; Ralf Habel, 02733-477493



**Mini Car Club Dortmund**, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609



**Oberhausen-Altstadt**, Am Fesder-turm, Oberhausen, Germany 46099; Josef Holl, 0208-403676



**Panik Raceway**, Teutonstr. 5, 51040 Düsseldorf, Germany 53844; Guido Kraft, 0224-400259

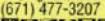


## GREECE

**EORA-Fanatix Racing**, 20 Iriniis Ave., Petki, Athens 15121; Mr. T. Diamandakis, 8025556



**R/C International Raceway**, P.O. Box GK, Agana; Robert (Buddy) Simpkins, (671) 477-3207



## HONDURAS

**Autodromo Accion**, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

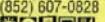


## HONG KONG

**H.K.R.C. Model Car Racing Club**, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822



**Kingsville Buggy Arena**, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828

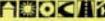


## INDONESIA

**Cipaku Indah Speedway**, Jl Cipaku Indah II/2, Bandung 40143, Indonesia; Cipaku Indah Hotel, Brad Lake, 011-62-2210219



**Everly's Racing**, Palm St., 188, Surabaya, Jatim, Indonesia; Jhon Mudi, 011-62-31-595-888

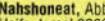


**Pondok Cabecircut**, Jl. Kunir No. 83, Pondok Cabe, Ciputat, Jakarta, Indonesia; Ali Agus Salim, 7403568-9; fax 7491533



## ISRAEL

**Ircca Off-Road**, Rahanana, Israel; Yaron Zafiris, (972) 030549937



**Nahshoniet**, Abba Niles Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252



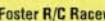
## ITALY

**Associazione Modelisti Cossato**, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romilda, 015-405881; fax 015-822709



## JAPAN

**Courtney Off-Road**, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



**Foster R/C Raceway**, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674



**Hansen Off-Road**, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



**I.T.O.**, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141



## NETHERLANDS

**H.F.C.C. Hollandia**, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820

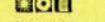


## NEW ZEALAND

**Capital Model Racers**, Avalon, Lower Hutt, New Zealand; Roger Whitmarsh, 04-566-5714



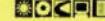
**Iwakuni R/C Track**, PSC 551, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662



**Misawa R/C Raceway**, PSC 76, Box 2946, FPO AP 96139-2946; Terry Brancheau, (011) 81176535161 ext. 222-5324



**Yokata R/C Racers**, PSC #78, Box 3619, FPO AP 96326, Tokyo, Japan; Victor Giles, 011-81-0425-52-2511 ext. 225-9025



**Zama Off-Road Raceway**, 17th ASGM Unit 45013, Box 3232, FPO AP 96338, Japan; SFC Ken Campbell, 011-81-3117-63-8478



## LEBANON

**Wild Willy RCC**, Oscar St-Jal Eddie, Beirut, Lebanon; 00961-1-403751



## MALAYSIA

**Titiwangsa Raceway**, Lot 128, Ampang Park, Shopping Centre, Jalan, Ampang, Kuala Lumpur, Malaysia 50450; R.A.C.E. Sdn Bhd, 03-2514496



## MEXICO

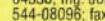
**Alces Off Road**, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830, Jorge Bustamante, (667) 1647-86729



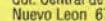
**Baja Jr.**, H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax, 681-26430



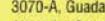
**Club Kyoso de Automodelismo Departing**, Av. Pacifico 216 Coyoacan; Ajusco-Toluca Km 15.3 DE, Mexico 04330, Ing. Jorge Perez Holder (525) 544-08096; fax, (525) 544-7133



**Dinamo Coca-Cola**, Ruiz Cortines 620 Col. Central de Carga, Guadalupe, Nuevo Leon 67120; Sergio Garza, (83) 35-709-79-32-33



**Hobby Centro**, 12 De Diciembre No. 3070-A, Guadalajara, Jal 45550; Alejandro Ortiz Del Toro, (36) 21-46-28



**Hobby's Formula**, Av observatorio 457 DF 01120; (905) 502-3620



**Hobby Model's Raceway**, Blvd. Garcia de Leon, 1555, Morelia, Michoacan 58260; (431) 5-01-22



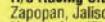
**Jaguar R/C Club**, Calz. Zavala 116, Puebla 72150; Chema, Denise or Chiro, (22) 31-01-99, (22) 33-00-94



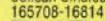
**La Hielera**, Prof Corregidora Nte 350, Queretaro, ORO C P 76160; Jorge Morelos Rabell, (42) 12-15-25



**Pista Casino**, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhart, (73) 19-12-38



**R/C Racing Club**, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, (3) 616-73-47

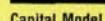


**Tony's Track**, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141



## NETHERLANDS

**H.F.C.C. Hollandia**, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820



**NEW ZEALAND**

**Capital Model Racers**, Avalon, Lower Hutt, New Zealand; Roger Whitmarsh, 04-566-5714



## NEW ZEALAND

**Capital Model Racers**, Avalon, Lower Hutt, New Zealand; Roger Whitmarsh, 04-566-5714



**Counties R/C Raceway**, Pukeko Showgrounds, Station Rd., Pukeko, New Zealand; R. Northcott, 09 2380 344



**Harewood Radio Control Car Club**, 550 Sawyer Arms Rd., Christ Church, New Zealand; Dean Johnson, 09 3880 344



**M.A.C. Vlymen**, Hendriklaan 6, Vlymen, Netherlands; Ju Kasteren, 011 317 517906



**Papakura Indoor R/C Car Club**, 25 Tainere Cres., Papakura, Auckland; Colin Perry, (09) 298-4711



**Western District R/C Off-Road Car Club**, CNV Bancroft/Akatea Prive, Auckland; Chris, (09) 838-5201



**NORWAY**

**Aurskog R/C Club**, Aurskog, 1930 Aurskog, Norway; Tommy Gjelseth, 47-63-86-21-61



**Dalen Raceway**, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95



**Hadeland Raceway**, 2750 Gran, Gran Norway; Dag Bakke-Nilssen, 61330405



**Store-Baller Raceway**, 2750 Gran, Gran Norway; Ola Raastad, 61330225



**Boyle R/C Hobby Shop**, Unit No. 10 Lucas Commercial Center, Marcos Hiway, Decemberamot, Antipolo, Rizal, Jose "Boy" Chua, 721-2555



**Phillipine F1/Touring Club**, Super Mall 1, EDSA, Quezon City 1156; Raymond Aguilar/ Ron Villafior, 896-64-15-23-30-08



**Quezon City Radio Control Club**, Quezon City Memorial Cir., Quezon City, Benji Lumanlan, 731-94-53



**PORTUGAL**

**Aero Clube da Madeira**, Rua do Castanheiro E-2, Funchal, Madeira, Portugal; fax 091-221265



**Banana County R/C Racing Club**, P.O. Box 988, Margate, 4275, Dennis Steemans, 23 (0) 391-20975



**Gordons Bay R/C Club (GBRC)**, Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865



**Helderberg Radio Control Thunderdrome**, Lion's Club Kanyamazene Rd., Nelspruit, Eastern Transvaal; Martin Van Der Merwe, (0311) 534-6415



**Lowfield Radio Control**, Parow Car Club, Northern Sports Complex, Parow, Cape Province; Stirling Spengler, (021) 945-4957



**Phoenix Raceway**, 11 Tugela St., Stilfontein, Transvaal; Lionel Edwards, (018) 4842863



**Pietersburg Model Racing**, Landro Marais St., Pietersburg, Northern Transvaal; Peter Van Vuuren, (0152) 293-0700



**PRO-LINE**

# TRACK DIRECTORY

**R.C. Superbowl**, Elsburg Sports Grounds, Elsburg, Johannesburg; Karl Fawcett, 27119076145



**R.A.C.E. Off Road**, Cecil Payne Stadium, Maraisburg, Gauteng; Derrick Plank, (011) 682-2173



**Rustenburg Off-Roaders**, Olympia Stadium, Rustenburg, Northwest Province; Jan Van Vollenhoven, (0142) 24-846



**Pretoria Off Road R/C Club**, Joost Bekker Caravan Park, Decemberville, Pretoria, Gauteng; Gert Swart, (012) 377-3238



## SPAIN

**ADAM**, Mina Flores de la Sienna, Madrid, Spain Alvaro Sarabia, 01-7471113



**A.D. Diablicos**, Morata De Jalon, 50,260 Zaragoza, Spain; Juan Carlos Vicente de Vera, 34-76-605350



**Club Modelismo Castilla**, P.O. Box 491, Burgos, Spain 09080; A.J. Perea, 011-34-47-240130



**Club Social Sevillana**, Ctra. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282



**Motoclub Castellon R.C.**, Rafalena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411



**Outlaw-Ultima II**, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298



**ROARCR**, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); P.O. Kelly Sexton, 011-34-56-822652



**CRAEM**, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952



## SWEDEN

**Amalie Racetrack**, Hjort Vagen 14, 5-46632 Sollenbrunn, Sweden; Tage Johansson



**PROCAR Speedway**, Industriagatan 8, 430 20 Veddige, Sweden; Lars Nordin, 46-0-340-38784; fax 46-0-340-38694



**Sollenbrunn Miniracing Club**, Hjortvagen 14, S-446 32 Sollenbrunn; Tage Johansson, 46-322-40944

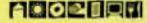


## SWITZERLAND

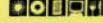
**E.M.B.C.M. Raceway**, Main Street, opposite police station, 8854 Sieben, Switzerland; Markus Schmid, 01-9233621



**ERMC Raceway**, 14 Ch de Taverney, 1218 Grand-Saconnex, Switzerland; M. Maurer, 19-41-22-798-9765



**JMRCV-Terraindu Levant**, Chemin ou Levant, 1290 Versoix, Geneva, Switzerland; fax, 19-41-22-7790805



## THAILAND

**Bangkok R/C Spa Huemark**, 164/1 Lardprao SOI 96, Wangthonglang Bangkok, Bangkok, Thailand 10310; Mr. S. Sanghavasi, (662) 931-8390, fax (662) 587-1186



**Radio Control Speedway**, 16 Soi Sua-Yai-Uthit, Rajadapisek Rd., Chatujak, Bangkok 10900; Mr. Noppakorn and Mr. Suteerapong S., (66-2) 541-6398 or fax (66-2) 541-6399



## TURKEY

**Mosi-Oa-Tunya**, H9619 Highland Harare, Harare Country, Maslormaland, Zimbabwe; 46237



**B&B OTO Given Raceway**, Gaziosmanpasa Sokak Kadiibik, Goztepe Parki, Istanbul, 4186118, or 0216-3490742



## VENEZUELA

**R/C Mariche**, KM4 Zona Industrial, Del Este Vía Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993



**Santa Paula R/C Club**, Polideportivo de Santa Paula urbanization Santa Paula El Cafetal, Caracas, P.O. Box 66886 Plaza las Americas; Isaac Abecasis 02-2423954 or Franco Agrusa 02-4510314



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## ZIMBABWE

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**PRO-LINE**

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<input type="checkbox"/> Banked	<input type="checkbox"/> Automatic
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<input type="checkbox"/> Carpet	<input type="checkbox"/> Food available
<input type="checkbox"/> Concrete	

**Return to:****Track Directory****Radio Control Car Action**100 East Ridge  
Ridgefield, CT 06877-4606**ASSOCIATED RC10B2**

(Continued from page 185)

used. Mine has over 100 runs on it, and it's still nearly as smooth as when new. When I finally decided to rebuild it, I installed MIP's new lightweight steel out-drives (less rotating mass) and a pair of their CVD drive shafts.

- Aluminum parts.** Badd Boyz\* offers an extensive line of colored, anodized parts for the B2, and I decided to deck out mine with their blue parts, which really make my B2 stand out from the rest.

**PERFORMANCE**

I usually test my off-road cars at R/C Madness in Enfield, CT. This outdoor track is very challenging, and it can get quite bumpy during a day of full racing action.

The last time I raced my B2 in Enfield, the track had become so bumpy by the third round of qualifying that I had a hard time just making it through some of the more difficult sections without getting bounced around or even flipping. During its first run, my new and improved B2 was noticeably smoother through the bumps; however, its rear still tended to bounce a bit. Back in the pits, I switched to Associated's black springs (softest), enlarged one of each shock piston's holes using a no. 53 drill bit and moved the tops of the rear shocks to the inner hole. These changes really seemed to help stabilize the car through the bumps.

The biggest test of the new suspension tweaks came during the main events because by this time, the track was severely rutted and torn up. The car was so much better through the bumps that I couldn't believe it was the same one. In fact, one friend commented that my B2 seemed "glued to the track." Acceleration through the bumps was also improved, mostly because of the Hydra Drive, which prevented the tires from breaking loose.

The B2 has proven to be a truly great machine. Over the months since its initial test, it has seen quite a few races (and crashes) and has come through without a scratch. In fact, it has yet to break!

If you run your B2 on smooth "blue-groove"-type tracks, the stock setups (as recommended in the instruction manual) will work fine. However, if you run your car on bumpy outdoor tracks (as I do), you should give some of these setups a try. I think that they make the car easier to drive and more forgiving. More than likely, Associated will include the new suspension arms as a "running change" in all new B2 kits, probably with new springs as well.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.

# Attention Racers!

**Become famous!** Get your picture in the Track Directory as one of our "Racers of the Month." Send in a photo of yourself with your car or truck, and tell us where you race (the track must be listed in the Track Directory). If you're picked as a Racer of the Month, your picture will appear in the Track Directory, plus you'll win \$250 (retail value) worth of Pro-Line, Protoform and Jaco products.

Send your entries to: Racer of the Month, c/o Pro-Line Racing, P.O. Box 456, Beaumont, CA 92223.



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**Associated Electrics**, 3585 Cadillac Ave., Costa Mesa, CA 92626-1403; (714) 850-9342; (714) 850-1744.

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**Ballistic Batteries**, P.O. Box 30344, Phoenix, AZ 85046-0344; (602) 493-3717; fax (602) 493-5007.

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**Blue Thunder**, distributed by Horizon Hobby Distributors (see address below).

**BRP**, 1575 Lowell St., Elyria, OH 44035; (216) 284-0270; fax (216) 284-0271.

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**Deans Connectors**, 7628 Jackson St., Paramount, CA 90723; (310) 634-9401.

**Dremel Tools**, P.O. Box 1468, Racine, WI 53401-1468; (414) 554-1390; fax (414) 554-7654.

**Du-Bro Products**, P.O. Box 815, Wauconda, IL 60084; (800) 848-9411; (847) 526-2136; fax (847) 526-1604.

**DuraTrax**, distributed by Great Planes Model Distributors, P.O. Box 9021, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

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**Futaba Corp. of America**, P.O. Box 19767, Irvine, CA 92713-9767; (714) 455-9888; fax (714) 455-9899.

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**JR Remote Control**; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

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**Kyosho/Great Planes Model Distributors**, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

**Lunsford Racing**, 2500 Three Lakes Rd., Ste. A, Albany, OR 97321; (503) 928-0587; fax (503) 967-5917.

**Maxtec Development**, 3740 Overland Ave., Ste. B, Los Angeles, CA 90034; (310) 815-0251; fax (310) 815-0253.

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**Novak Electronics**, 18910 Teller Ave., Irvine, CA 92612; (714) 833-8873; (714) 833-1631.

**OFNA Racing**, 22600 D Lambert, Ste. 1009, Lake Forest, CA 92630; (714) 586-2910; fax (714) 586-8812.

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**Serpent Inc. USA**, West Park Center, 2832 NW 79th Ave., Miami, FL 33122; (305) 639-9665; fax (305) 639-9658.

**Tamiya America Inc.**, 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; (714) 362-2250.

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**Trinity Products**, 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

**Yokomo Ltd.**; distributed by GHI/Ultimate Hobbies (see address above).

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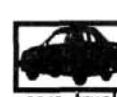
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## This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire Car Action staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. My internet address is: chris@airage.com.

## Chris's

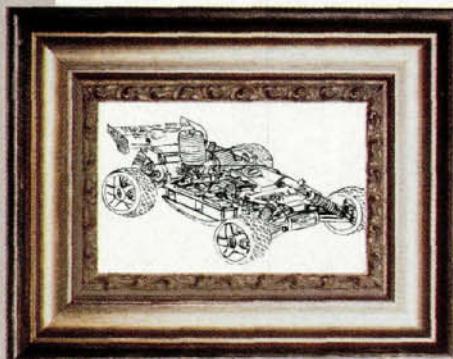
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## R/C Artistry

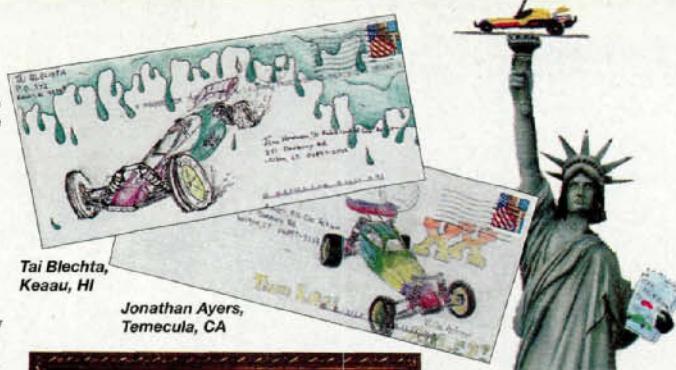
Once again you make me proud, lads! As you can see, the gallery is a wee bit more orderly this time around. I mean, what with frames and all, are we getting civilized here? It has not a thing to do with the quality of the work. (In fact, I do get a real charge out of the artwork on the envelope.) It's just that, well, I've been feeling overly tranquil as of late. I mean, shamin' Frank, Doogie and George on the parking lot the way I have these days, ya know, I could be in serious danger of becoming a self-actualized nut-case. Don't worry, the novelty of being the greatest

will be wearin' thin soon I should think, and I'll be quite out of my mind once again—100-percent daft and feelin' me old self in no time a'tall.

Just one more thing. I know some of you most talented artists out there are among the most shy. Be brave! Don't think about it. Just do it, and do it now!



Barry Yir, Carlton, Victoria, Australia



Tai Blechta,  
Keaua, HI

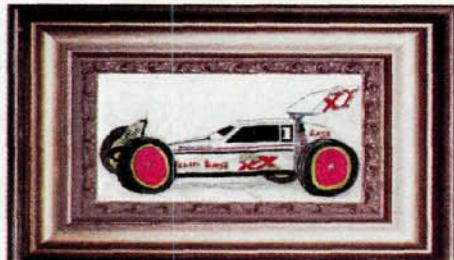
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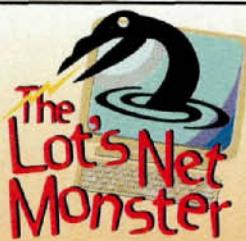
Christian Ginter, Ocala, FL



Peter Knipschield & Joe Brooks, Dakota, IL



Zeke Salcido, Decatur, AL



Chris, Practice ... focus ... relax ... win ... have fun ... yes, yes! The master has spoken, once again, his words of wisdom! Thank you! I hope all those hot-head hotshots out there read this. The key to WINNING is not how fast your car is, what type of car you have or how big your tool box is. The key to winning is how the car is set up and how smoothly it's driven. I started racing back in 1987 with a Tamiya Hornet! After weeks of practice, and getting a feel for the car, I dialed-in a great setup for my very first race. I took second. Within a matter of weeks, I began to win race after race—with a stock

Hornet! The other guys had RC10s, tables with five lights, power tools, more tires than the hobby shop and huge (and I mean huge) tool boxes. One guy even had an air compressor. For what? I don't know. Anyway, to get to the point, I beat guys with the best of everything and all I had was a stock car and a little patch of grass to practice on ... but I had one thing they did not. I knew how to drive the car smoothly around the track. I had a 540 to their modified motors, and I beat them week after week. All because of the champions motto ... develop solid racing skills and drive smoothly and consistently through the heats. They could not handle the fact that having the best is not always the best. The best is making what you have work! Later on!

Bob Allen  
RAAllen9178@aol.com

Bob, you're right.  
They can't handle the truth!  
CC

I couldn't agree more with the October "Back Lot." I have a friend who has bought more stuff for his Losi Double-X and Double-XT than he knows what to do with. This is fine, except that it's not helping him any. Actually, his fastest lap came when his speed control shut down to half throttle because he was running too hot a motor. I'm 15, so I'm on a limited budget. My lineup is limited to a completely stock RC10B2, (had a T2 and beat him every weekend), three matched packs, a pack charger, and some spare tires and parts, and I do fine each weekend. I do plan to add some goodies, however. You've got the best part in the magazine as far as I'm concerned so keep it up! (I also like the rest of the magazine).

John "Throttle-Happy" Kraft  
TKAPGA@aol.com

John,  
You've not only become a skilled racer,  
but you've saved \$\$\$ in the process.  
Smart man.  
CC

Hey Chris,  
I thought that your "Back Lot" in the last issue of R/C Car Action was right on the money! Practice has always separated the winners from the losers. I've been racing (off and on, mostly off) since 1980, and "trickitus" never helped me win a race. Only practice and perfect car preparation win consistently!! Keep up the great work.

Erik Kullenberg  
Team Paris/Picco

Thanks Erik,  
You keep up the great work, too.  
CC

Hey Chris,  
You suck!  
Richard  
FFVNJ2001@aol.com

Hi, Dick.